

A taxonomic revision of *Amischotolype* (Commelinaceae) in Asia

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ABSTRACT. A taxonomic revision of the Indomalayan part of the paleotropical genus *Amischotolype* Hassk. (Commelinaceae) reveals 22 species in Asia, of which eight are described as new (*A. barbarossa* Duist., *A. divaricata* Duist., *A. dolichandra* Duist., *A. lobata* Duist., *A. parvifructa* Duist., *A. pedicellata* Duist., *A. strigosa* Duist., *A. welzeniana* Duist.), and three are new combinations (*A. hirsuta* (Hallier f.) Duist., *A. leiocarpa* (Hallier f.) Duist., *A. rostrata* (Hassk.) Duist.). The status of the closely related genus *Porandra* Hong is discussed although results of a molecular study are required to make a final decision on its generic status. For now the genera are kept separate, but the species of *Porandra* are included in the key to the species of *Amischotolype*.

Keywords. *Amischotolype*, Commelinaceae, *Forrestia*, morphology, *Porandra*, revision, taxonomy

Introduction

Amischotolype is a genus of the Commelinaceae (Spiderwort family), a family of about 650 species in 41 genera with a cosmopolitan distribution (although with no native species in Europe; Faden 1998). Faden and Hunt (1991), in their Commelinaceae classification based upon morphology, anatomy, palynology and cytology, placed *Amischotolype* in the subtribe Coleotrypinae Faden & D.R.Hunt with the African genus *Coleotrype* and Asian genus *Porandra*. Important characters of the subtribe included leaf epidermal cells with silica, axillary inflorescences, flowers with 6 fertile stamens and seeds with a linear hilum. Faden & Hunt's classification was later supported by cladistic analysis of morphological data (Evans et al. 2000) and by *rbcL* sequences combined with morphology (Evans et al. 2003). The chromosome numbers ($2n = 18, 36$ with a basic chromosome number $x = 9$) and the karyotype of several species of this subtribe are very similar (Yuan & Yang 2006).

Generic delimitation

The first species were described from Java by Blume (1827) in *Campelia*, as *C. mollissima* and *C. marginata*. *Campelia* was described by Richard (1808) based on a

species from tropical America. A third Old World species was discovered in New Guinea and described by Richard (1834) as a new genus associated with the Colchicaceae and Asparagaceae. He named it *Forrestia* (with a single species *F. hispida*), after the British explorer who was the first to visit New Guinea, Thomas Forrest (1729–1802) of the East India Company. Hasskarl (1852), unaware of A. Richard's work, added another species from Java to *Campelia* (though with an illegal name, see discussion under *A. glabrata*). Several years later, when Hasskarl received material on loan from Berlin, he realised that the Asian species of *Campelia*, with sessile inflorescences, were very different from the American species which had pedunculate inflorescences. Comparison of the Javanese species with Richard's description of *Forrestia* (1834; in Kunth 1843) which states "*flores rubri, supra vaginam exserti...*" led Hasskarl to translate this as "inflorescence terminal", which was manifestly different from his species that had axillary inflorescences. Hasskarl (1863) transferred the Asian species of *Campelia* to a new genus next to *Forrestia*: *Amischotolype*. The name refers to the sessile glomerules of flowers, the character that immediately distinguishes it from the American species of *Campelia* (which are now united with *Tradescantia*, see Hunt 1986). A year later, after having studied the type material of *Forrestia*, Hasskarl (1864) transferred his three species of *Amischotolype* to *Forrestia*. He also added two new species, one from India (*F. hookeri*) and one from Java (*F. rostrata*), bringing the total number of species in Asia to six. In the following years, more than 10 species were described from Asia, the latest *A. sphagnumrhiza* Cowley (Cowley 1996). The first African species was described by Clarke (1881, in *Buforrestia* C.B. Clarke), followed by three more species (Schumann 1897, Clarke 1901, De Wildeman 1909).

From Hasskarl (1864) onwards, the generic name of *Forrestia* was commonly (but not exclusively) used, until Pichon (1946: 235) pointed out that the *Forrestia* of Richard (1834) was a later homonym of *Forrestia* of Rafinesque (1806), the latter a genus in the Rhamnaceae, and argued that the correct genus name should be *Amischotolype* Hassk. While Richard (1834) did mention the existence of a genus *Forrestia* Schweack. in the Rhamnaceae (see De Jussieu 1820; the author name is a mystery and perhaps refers to Rafinesque's mother's name: Schmaltz), he considered the name available for use in the Commelinaceae because *Forrestia* Raf. was united with *Ceanothus*. A proposal to conserve *Forrestia* A. Rich. in the Commelinaceae (Babu & Dutta 1968) was rejected (see discussion by Rao 1971).

Hong (1974) described the genus *Porandra* from China as closely related to *Amischotolype*, differing by its climbing habit with branched and basally 'woody' stems, and by having thecae opening by apical pores (hence the name). These characters, however, are not unique for *Porandra*, as noted by Faden (1998: 112). This present revision reveals that *A. rostrata* (Hassk.) Duist. shares with *Porandra* both the branched and scrambling stem and thecae opening by an apical pore. A straggling habit also occurs in *A. divaricata* Duist., *A. dolichandra* Duist., *A. glabrata* Hassk. and *A. hispida* (A. Rich.) D.Y. Hong, while the opening of the thecae by an apical pore also occurs in *A. gracilis* (Ridl.) I.M. Turner (but there also by a longitudinal slit) and *A. griffithii* (C.B. Clarke) I.M. Turner. Faden (1998) argues that the two genera should be united based on the morphological evidence, and he is probably correct. However,

pending results from on-going molecular studies, the genera are here kept separate, as in Thitimetharoch et al. (2003). Nonetheless, it is interesting to note that the few field observations of anther colour in *Porandra* state violet (but sometimes only so at the margins: *R. Geesink* 6850), whereas in *Amischotolype* they seem to be white to yellow (with rare exceptions in *A. marginata* (Blume) Hassk.). For 10 out of the 22 Asian species, however, this information is lacking.

Need for revision

Amischotolype has a paleotropical distribution and the species typically grow in a forest environment, even surviving for a long time after disturbance of the forest, on rather dry to swampy soils. The most recent monographic revision of the genus was that of Clarke (1881). Since then, 12 more species have been described. For Asia, local flora treatments exist for the Himalaya (Hara 1966: 1 sp.), China (Hong & DeFilipps 2000: 2 spp.), Taiwan (Wang et al. 2000: 1 sp.), Japan and the Ryukyu Islands (Walker 1976: 1 sp.), Indo-China (Cherfils 1937: 7 spp.), Vietnam (Ho 1993: 3 spp., one species with two forms and two varieties), Peninsular Malaysia (Ridley 1924: 7 spp.: these all accepted in the checklist by Turner 1997), Singapore (Keng et al. 1998: 2 spp.), Philippines (Merrill 1925: 1 sp.), Borneo (Hallier 1916: 4 spp., one species with four varieties and one with two varieties), Java (Backer & Bakhuizen van den Brink 1968: 1 sp. with three forms), and New Guinea (Hallier 1913: 1 sp. with three varieties; Lauterbach 1913: 1 sp. with two forms). Nomenclature and species delimitation in these treatments differ considerably. Identification of species is further complicated because most authors provide no key to their taxa. Several authors (e.g., Hasskarl 1864, Backer & Bakhuizen van den Brink 1968) considered the amount of indument on the sheath and the lower surface of the leaf blade of high taxonomic importance, but this later proved to be variable within many species.

Most problematic is the application of the name *A. hispida* (A. Rich.) D.Y. Hong, now regarded as an East-Malesian species not reaching the Asian continent. Hooker (1864), who had not seen the type material, matched several collections from Java, Sumatera, Penang, Singapore, Sikkim and Assam with Richard's description of *F. hispida* and concluded that the distribution of the species ranged from NE India to New Guinea. Only few collections were cited precisely by Hooker, but those included specimens of at least *A. marginata* (Wallich s.n., Penang) and *A. gracilis* (Walker 155, Singapore). The epithet *hispida* is now erroneously used for continental Asian material (e.g., Hong & DeFilips 2000), most of which is correctly *A. glabrata*. Owing to this confusion, and because a number of species are quite variable, especially in the amount of indument on the leaves, estimations of the number of species for the genus differ considerably, ranging from six (Walker 1976) to 20 (Hong 1974). A revision of the genus seemed therefore much needed. The African species are excluded from this revision. There is no overlap in species between Africa and Asia.

Characters that have proved valuable for the delimitation of Asian species of *Amischotolype* include the indument of the internodes, and upper surface and margin of the leaf blade, the inflorescence position, the (relative) length and indument of the sepals, the length of anthers, and size and indument of the capsules. The present revision

of *Amischotolype* recognises 22 species for Asia, of which eight are new species (*A. barbarossa* Duist., *A. divaricata* Duist., *A. dolichandra* Duist., *A. lobata* Duist., *A. parvifructa* Duist., *A. pedicellata* Duist., *A. strigosa* Duist., *A. welzeniana* Duist.). Three new combinations are made (*A. hirsuta* (Hallier f.) Duist., *A. leiocarpa* (Hallier f.) Duist., *A. rostrata* (Hassk.) Duist.). *Amischotolype glabrata* is the most widespread species, occurring from E Pakistan through China to S. Japan (Ryukyu Islands) and south to Nusa Tenggara (Lombok), excluding the Philippines and Sulawesi.

Amischotolype Hassk.

Amischotolype Hassk., Flora 46: 392 (1863); Pichon, Notul. Syst. 12: 233 (1946); Hara, Fl. East. Himalaya 1: 399 (1966); Morton, J. Linn. Soc., Bot. 60: 167–221 (1967); Ho, Ill. Fl. Vietnam 3: 477 (1993); Keng, Chin & Tan, Conc. Fl. Singapore 2: 23 (1998); Hong & DeFillips in Wu & Raven (eds.), Fl. China 24: 23 (2000); Wang, Chen & Peng in Huang (ed.), Fl. Taiwan, ed. 2, 5: 153 (2000). TYPE SPECIES: *A. glabrata* Hassk. (designated by Pichon 1946).

Forrestia A.Rich. in Dumont d'Urville, Voy. Astrolabe 2: 1 (1834); Miquel, Fl. Ned. Ind. 3: 547 (1855); Hasskarl, Flora 47: 625 (1864); Hasskarl, Commelin. Ind.: 83 (1870); Hooker f., Fl. Brit. India 6: 383 (1894); Ridley, Fl. Malay. Penins. 4: 359 (1924); Merrill, Enum. Philipp. Fl. Pl. 1: 197 (1925); Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 169 (1930); Cherfils in Lecomte, Fl. Gen. Indo-Chine 6: 852 (1937); Backer & Backh. f., Fl. Java 3: 15 (1968); Walker, Fl. Okinawa S. Ryukyu I.: 298 (1976); *non* Rafin. (1806). TYPE SPECIES: *F. hispida* A.Rich. (= *A. hispida* (A.Rich.) D.Y.Hong)

Campelia auct., e.g., Blume, Enum. Pl. Javae 1: 7 (1827); Kunth, Enum. pl. 4: 109 (1843), *p.p.*; Hasskarl in Miquel, Pl. Jungh.: 154 (1852); Miquel, Fl. Ned. Ind. 3: 546 (1855); *non* L.C.M. Rich. (1808).

Plant perennial, herbaceous, rather succulent, exudate sticky and colourless. **Stem** solid, nodes very short and not thickened. **Leaves** with involute vernation, alternate in two ranks on erect part of the stem but at apex spirally arranged, herbaceous to somewhat coriaceous. **Sheath** tubular, closed, tightly covering the internode (loose dry material owing to shrinkage of the stem), the lower withering and deciduous as the plant matures, generally green (in species description mentioned only if otherwise coloured), longitudinally veined, more weakly transversely veined, apex truncate. **Leaf blade** (rather) thickly herbaceous, oblong to linear-lanceolate (2.3–7.4 times as long as wide), smooth or bullate, generally green (in species description mentioned only if otherwise coloured), longitudinally veined often with veins alternately thickened and more obvious on lower surface than on upper surface (except in *A. lobata* where they are very obvious on both surfaces), oblique transverse veins present (though not always distinct), base attenuate, apex acuminate to caudate, submarginal hairs (a row of hairs on the upper or lower surface of the leaf blade along the entire margin and here not included as leaf blade indumentum) present or absent. **Inflorescence**

a more-or-less condensed thyrses, strictly axillary, breaking through the base of the sheath if leaf is present; bracts broadly to narrowly triangular to rhomboid, 2–25 by 2.5–10 mm, thick herbaceous to coriaceous, glabrous to ciliate or hispid, pale green to purplish, midvein keeled, semiamplexicaulous, more-or-less decurrent on branchlet, apex obtuse to acuminate. **Flowers** almost actinomorphic, bisexual. **Sepals** 3, free, succulent, imbricate, outermost the longest (size given in species description refers to the longest sepal) and overlapping the inner two, innermost the shortest, persistent, midvein more-or-less keeled, apex obtuse. **Petals** 3, free, subequal, membranous, oblanceolate, obtuse, deliquescent soon after anthesis. **Stamens** 6, (sub-) equal, inserted on the receptacle; filaments free, tortuose; anthers basifixed, subglobose to oblong (deltoid in *A. glabrata*). **Ovary** 1, locules 3, equal; style 1, simple; stigma 1, capitate, apical. **Fruit** a (usually) dehiscent, succulent, white, pink, red, lilac, (brown-) purple or green capsule with 3 locules and (1–)2 seeds per locule, 3-lobed at apex or not, valves finally free to fused for up to 4/5 of length. **Seeds** uniseriate, reniform, surface coarsely rugose, hilum linear; aril fleshy.

Chromosomes. Basic chromosome number $x = 9$ (Morton 1967); mitotic counts: $2n = 18, 36$. Published counts of $2n = 20$ and $2n = 30$ are considered doubtful (see Yuan & Yang 2006, and references therein).

Distribution. Paleotropic, few (1 to 4) species in tropical Africa, 22 species in S, E and SE Asia (including India, China, Taiwan, Japan and New Guinea, but not Sri Lanka, Australia or Oceania).

Ecology. Primary forest and along forest streams, surviving a long time after disturbance, on rather dry to swampy soils, also on limestone. Altitude: 0–1980 m asl.

Notes. 1. Hasskarl's (1863) name *Amischotolype* (Greek, *amischos* = without stalk; *tolupe* = cluster) refers to the sessile glomerules of flowers.

2. The species delimitation in the work of Cherfil's (1937), presenting seven species, is very different from the one presented here. I have seen 24 specimens (P) that he identified; of these all his *F. glabratus*, *F. hookeri*, *F. monosperma* and *F. mollis* belong to *A. divaricata*, whereas specimens he identified as *F. uarginatus* are in fact *A. glabrata* and *A. divaricata*. In his *F. hispida* I saw specimens of *Pollia* sp., *A. hispida* and *A. glabrata*. His species descriptions can in no way be related to mine or any other. Moreover, it seems that measurements have been taken from material belonging to other genera (e.g., sepals 5–35 mm long, 2–13 mm wide for *F. glabratus* whereas maximum sepal length in *Amischotolype* is 18 mm, and maximum width 5.5 mm). Ho (1993) seems largely based on Cherfil's (1937). Both these accounts are largely ignored in the species protologues below. The new combinations made by Ho (1993) are all invalid, as he did not cite the basionym (McNeill et al. 2006, Art. 33.4).

3. It greatly helped that I had the opportunity, while based in Singapore, to study living material, both in the field and in cultivation, and make my own collections. The descriptions are based on my observations on living material of *A. glabrata*, *A.*

gracilis, *A. hookeri*, *A. irritans*, *A. marginata*, *A. monosperma* and *A. parvifructa*, supplemented with many observations on herbarium material. Unless mentioned otherwise, the stem is not scrambling and aerial (stilt-) roots have not been observed. The area between the horizontally creeping rhizome and the erect stem is called the knee. Hairs on different organs are colourless unless stated otherwise. Whether the surface of the leaf blades is bullate or smooth cannot be observed from herbarium material, and is here mentioned only for the species for which field observations are available. An inflorescence with more than 40 flowers is considered many-flowered. In some species sepals elongate after anthesis and change colour from whitish or green to pink or violet. As the colour is lost in herbarium material, it is unknown unless annotated by collectors. Petals and stamens are difficult to study because they are lost soon after anthesis. Herbarium material of some species have capsules with three 0.5–1.5 mm long lobes at the apex of the valves. As I have not seen fresh material of these species, I do not know if these lobes are artifacts, e.g. the result of the drying of fruits with very deeply depressed apex. The colour of the ripe fruit can vary in a single species from white to green, pink, red or purple. As far as the colour of the aril is known for the species, it is orange (to dark red) and strikingly contrasting with the colour of the capsule.

4. The dichotomous key to the 22 Asian species presented below uses characters in leaves, inflorescence position, sepals, petals, stamens and fruits. The characters that separate the two leads best are mentioned first, followed by characters with more overlap (if present). Not infrequently all characters cannot be observed in a single specimen. Character synopses are included in several Appendices in tabular form to allow comparison of species.

5. As I have seen in the field, mixed populations of two or three species do occur. Evidence from herbarium material suggests the same, e.g., mixed in a single accession or collections with successive numbers from identical locations. The combinations involve at least the following species: *A. barbarossa*, *A. gracilis*, *A. hirsuta*, *A. irritans*, *A. laxiflora*, *A. leiocarpa*, *A. marginata*, *A. mollissima*, *A. monosperma*, and *A. parvifructa*.

6. The genus is, for the time being, considered separate from *Porandra* (see Introduction). I have not seen type material of the three species that have been described in this genus. Based on 47 collections, 17 of which were cited by Thitimetharoch et al. (2003) as belonging to the genus *Porandra*, I recognise two species, *P. ramosa* Hong and *P. scandens* Hong. They are included in the key to the species below. Based on the descriptions, I consider *P. microphylla* Wan to be a synonym of *P. scandens*.

Key to the species

- 1a. Leaf blade hairy on both surfaces, hairs (0.5–)1–4 mm long and often yellow; if hairs on one surface less than 1 mm long, then hairs on the other surface at least 1.5 mm long; submarginal hairs present on upper surface 2
- b. Leaf blade hairy on one surface or glabrous, if hairy on both surfaces then hairs

- shorter than 1 mm long and either at least one surface with hairs up to 0.5 mm long (excluding submarginal hairs and hairs near or on midvein), or submarginal hairs present on lower surface 6
- 2a. Sheath (except at mouth) glabrous or with a few hairs at base 3
- b. Sheath with several lines of 2–4(–10) mm long hairs 4
- 3a. Sheath 7–13 mm diameter. Sepals in flower and fruit 4.5–7.5 mm long, sparsely to moderately (rarely densely) hairy with hairs 0.5 mm long. Petals glabrous. Capsule exceeding sepals by (1.5–)3.5–6 mm 6. *A. griffithii*
- b. Sheath 10–20 mm diameter. Sepals in flower 6.5–10.2 mm long, in fruit 10.5–13 mm long, moderately to rather densely (dark-)red spiny-hairy with hairs 1.5–2.5 mm long. Petals on dorsal surface subapically with a 2 mm long spot of 1–1.5 mm long red spiny hairs. Capsule shorter than sepals by 3–4.5 mm 10. *A. irritans*
- 4a. Sepals 10.5–16(–18) mm long. Capsule shorter than sepals by 4–9 mm, hairs soft; valves fused for 1/4 to 1/2 of length. [Philippines, New Guinea] 8. *A. hispida*
- b. Sepals (4.5–)6–10 mm long. Capsule 2 mm shorter to 4 mm longer than sepals, hairs stiff; valves free (almost to the base). [Sumatera, Borneo] 5
- 5a. Sepals glabrous or margins and keels ciliate with colourless hairs 0.5–1 mm long. Capsule (equaling or) exceeding sepals by up to 4 mm, hairs yellow 7. *A. hirsuta*
- b. Sepals rather densely hairy with red, spiny hairs 2 mm long. Capsule shorter than sepals by 2 mm, hairs red 21. *A. strigosa*
- 6a. Inflorescence on the creeping, leafless part of the stem (rhizome) on the ground or at the (leafy) knee just above the ground; peduncle (0–)2–40 mm long 7
- b. Inflorescence on the erect, leafy part of the stem well above the ground, peduncle 0–5 mm long; if at the knee then peduncle absent 10
- 7a. Stem with many above-ground sphagnum-like orange branched roots. Sheath glabrous. Leaf blade smooth, lacking submarginal hairs 20. *A. sphagnumrhiza*
- b. Stem with above-ground roots absent or simple and whitish to brownish. Leaf blade bullate. Either sheath with lines of 1–6 mm long hairs and/or leaf blade with submarginal hairs present 8
- 8a. Sheath with lines of orange to orange-brown or red hairs. Leaf blade green on upper surface, (usually) red to purple on lower surface, (6.5–)9–16 cm wide. Sepals with margins and keel sparsely to rather densely (0.5–)1–2 mm long orange- to red-brown-hairy. Capsule with orange to red-brown hairs 1–2 mm long 16. *A. monosperma*
- b. Sheath usually with lines of (pale) yellow(-brown) hairs, rarely glabrous or with red, appressed hairs 0.1–0.5 mm long. Leaf blade (2.7–)4–8(–10.6) cm wide.

- Sepals glabrous to rather densely hairy with 0.2–0.5(–1) mm long colourless- to red hairs. Capsule glabrous or with colourless hairs 0.1–0.5(–1) mm long 9
- 9a. Sepals (9–)10–14 × 1.5–2.5 mm, white, green, pinkish or red-purple in flower and red, (deep) purple (and green), magenta or violet in fruit. Capsule shorter than sepals by 2–5 mm 11. *A. laxiflora*
- b. Sepals (6–)7–10 × (2–)3–4(–5.5) mm, cream to beige or yellow-brown in flower, pink to (red-) purple in fruit. Capsule 1.5(–2) mm shorter to 1.5(–3) mm longer than sepals 14. *A. marginata*
- 10a. Sepals and capsule with orange to dark-red or brown hairs 1. *A. barbarossa*
- b. Sepals glabrous or with colourless, white or yellow hairs. Capsule glabrous or with colourless, white, yellow or rarely brown hairs 11
- 11a. Capsule shorter than sepals by (1–)2–9 mm 12
- b. Capsule equalling or exceeding sepals by up to 9 mm 17
- 12a. Capsule 3-lobed at apex when dried, lobes 0.5–1.5 mm long 13
- b. Capsule not lobed at apex when dried 15
- 13a. Anthers 2–2.2 mm long. Capsule glabrous; valves fused for 4/5 of length. [Myanmar, Thailand] 22. *A. welzeniana*
- b. Anthers 1–1.3 mm long. Capsule covered in 0.2–2 mm long hairs; valves free to fused for 1/3 of length. [Sumatera, Java, Borneo] 14
- 14a. Leaf blade with veins distinct on upper surface, base very abruptly narrowed, pseudopetiole 3.5–9.5 cm long and 0.5–1 mm wide winged. Capsule hairs 1–2 mm long, bristly. [Borneo] 13. *A. lobata*
- b. Leaf blade with veins indistinct on upper surface, base very gradually to abruptly narrowed, pseudopetiole indistinct or up to 4 cm long with wings 1.5–2 mm wide. Capsule hairs 0.2–1 mm long, soft. [Sumatera, Java] 15. *A. mollissima*
- 15a. Flowers with pedicel 2–6 mm long. Leaf blade (19–)28–48 cm long. Capsule apex slightly depressed 8. *A. hispida*
- b. Flowers without pedicel. Leaf blade 15–28 cm long. Capsule apex obtuse 16
- 16a. Sepals 7.5–9 mm long. Filaments glabrous. Anthers 3 mm long. Capsule valves free. [India] 3. *A. dolichandra*
- b. Sepals (9–)10–14.5 mm long. Filaments with 1–3 mm long hairs in upper half. Anthers 0.6–1.0 mm long. Capsule valves fused for 1/3 to 1/2 of length. [Pakistan, E through India and China to Japan, and S to Nusa Tenggara] 4. *A. glabrata*
- 17a. Submarginal hairs absent or on lower surface (and sometimes margin) of leaf blade 18

- b. Submarginal hairs present on upper surface (and sometimes margin) of leaf blade 21
- 18a. Inflorescence 4–10-flowered. Anthers opening by an apical pore. Stem simple or branched. Leaf blade 13–23 cm long 19
- b. Inflorescence 10–30-flowered. Anthers opening by a longitudinal slit in upper half or along the length of anther. Stem simple. Leaf blade 18–35 cm long 20
- 19a. Inflorescence 4–7(–10)-flowered. Anthers drip-shaped to deltoid, purple. [India, China, Myanmar, Lao P.D.R., Vietnam, Thailand] *Porandra ramosa*
- b. Inflorescence 7–10-flowered. Anthers subglobose to oblong, white. [Sumatera, Java, Maluku] 19. *A. rostrata*
- 20a. Leaf blade on lower surface glabrous or hairy only between the veins. Sepals 4.5–6.5 mm long. Capsule 6.5–8.5 mm long. [Borneo] 12. *A. leiocarpa*
- b. Leaf blade on lower surface hairy on the veins. Sepals 7–10 mm long. Capsule 9–14 mm long. [India, Bangladesh] 9. *A. hookeri*
- 21a. Submarginal hairs 0.1–0.4(–1) mm long, if longer than 0.5 mm, then sheath with a ring of 0.5–1 mm long hairs at node, anthers 2–2.5 mm long and capsule valves fused for 1/4 to 1/2 of length 22
- b. Submarginal hairs (0.7–)1.2–2.5 mm long. Sheath glabrous or with hairs evenly scattered or in lines. Anthers 1.0–1.8 mm long. Capsule valves free 24
- 22a. Sepals 4.5–6.5 mm long, glabrous or rarely sparsely 0.2–0.3 mm long hairy. Capsule glabrous 12. *A. leiocarpa*
- b. Sepals 7–10.5 mm long, glabrous or 0.2–1.5 mm long hairy. Capsule 0.5–2.0 mm long hairy 23
- 23a. Sheath with a few lines of hairs and/or a ring of hairs at the node, hairs 0.5–3 mm long. Capsule 11.5–16 mm long, dark green to pink or reddish, bristle-hairy with hairs 1.5–2 mm long. [Myanmar, Cambodia, Lao P.D.R., Thailand, Sumatera]
..... 2. *A. divaricata*
- b. Sheath with scattered hairs 0.1–0.2 mm long. Capsule 7–9 mm long, white to pink, rather soft-hairy with hairs 0.5–1 mm long. [Peninsular Malaysia-Cameron Highlands] 17. *A. parvifructa*
- 24a. Sepals 4.5–7 mm long. Inflorescence 4–15-flowered. [SE Asia mainland, Sumatera, Borneo] 25
- b. Sepals (7–)8.5–11.5 mm long. Inflorescence 10–40-flowered. [Borneo] 26
- 25a. Sheath glabrous or rarely with 1 or a few lines of 0.5–2 mm long hairs. Anthers white to pale yellow. Capsule 0.7–1.5 mm long hairy, valves free. [Peninsular Malaysia, Singapore, Sumatera, Borneo] 5. *A. gracilis*

- b. Sheath with a single line of 1–3 mm long hairs. Anthers at least at margin violet to purple. Capsule glabrous or 0.3–0.7 mm long hairy, valves fused in basal 1/2 to 2/3. [China, Laos, Vietnam, Thailand, Sumatera] *Porandra scandens*
- 26a. Leaf blade abruptly narrowed into a 3.5–9.5 cm long pseudopetiole, veins very distinct on upper surface. Capsule 3-lobed at apex when dried, lobes 1–1.5 mm long, style remnant absent 13. *A. lobata*
- b. Leaf blade gradually to rather abruptly narrowed with pseudopetiole indistinct or up to 5 cm long, veins not distinct on upper surface. Capsule not lobed at apex when dried, style remnant 0.7–1 mm long and persistent 18. *A. pedicellata*

1. *Amischotolype barbarossa* Duist. sp. nov. (Fig. 1 & 11A–B)

Amischotolype mollissimae et *A. hispidae* similis, internodiis pilis 0.5–1 mm longis, vaginis capsulisque pilis aurantiacis ad rubris vel raro fulvis, laminis praecipue infra pilis submarginalibus differt. TYPUS: Ridley 2950, Peninsular Malaysia, Perak, Larut Hills (holo SING).

Amischotolype mollissima auct., sensu Turner, Gard. Bull. Sing. 47 (1997) 515; *non* (Blume) Hasskarl., Flora 46 (1863) 392.

Forrestia mollis auct., sensu C.B. Clarke in A. Candolle & C. Candolle, Monogr. Phan. 3 (1881) 236, p.p. [*A.C. Maingay* 1712 p.p.; see note under *A. griffithii*]; Hooker f., Fl. Brit. India 6 (1894) 383, p.p.; Ridley, Mat. Fl. Malay. Penins. 2 (1907) 124; J. Malayan Branch Roy. Asiat. Soc. 1 (1923) 103; Fl. Mal. Pen. 4 (1924) 360; *non* Hasskarl, Flora 47 (1864) 628, *nom. superfl.* (= *A. mollissima* (Blume) Hassk.); *non* Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 170 (= *A. gracilis*).

Forrestia mollissima auct., sensu Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169; *non* (Blume) Koord.

Stem ascending from short creeping rhizome; erect part 50–200 cm long, simple; internodes (moderately to) densely (0.5–)1 mm long hairy. **Sheath** 10–17 mm diam., with at least a few frontal lines of 1.5–4 mm long, yellow to orange or brown hairs, in between glabrous to moderately 0.1–0.5 mm long hairy, mouth ciliate. **Leaf blade** 21–45 × (5–)7–13 cm, 2.9–4(–5) times as long as wide, base gradually to rather abruptly narrowed into a winged pseudopetiole 3–4 cm long and 1.5–3 mm wide; lower surface moderately to densely 0.5–1 mm long yellow- to reddish brown-hairy, upper surface glabrous or rarely sparsely to moderately 0.1–0.2 mm long hairy; submarginal hairs on lower surface, rarely also on margin and upper surface, 1–2 mm long, dense, yellow to yellow-brown. **Inflorescence** on erect stem and at knee, sessile, 2–3.5 cm diam., (very) dense with branches obscure, 15–30-flowered. **Pedicel** 0.5 mm long. **Sepals** 7.5–12.5

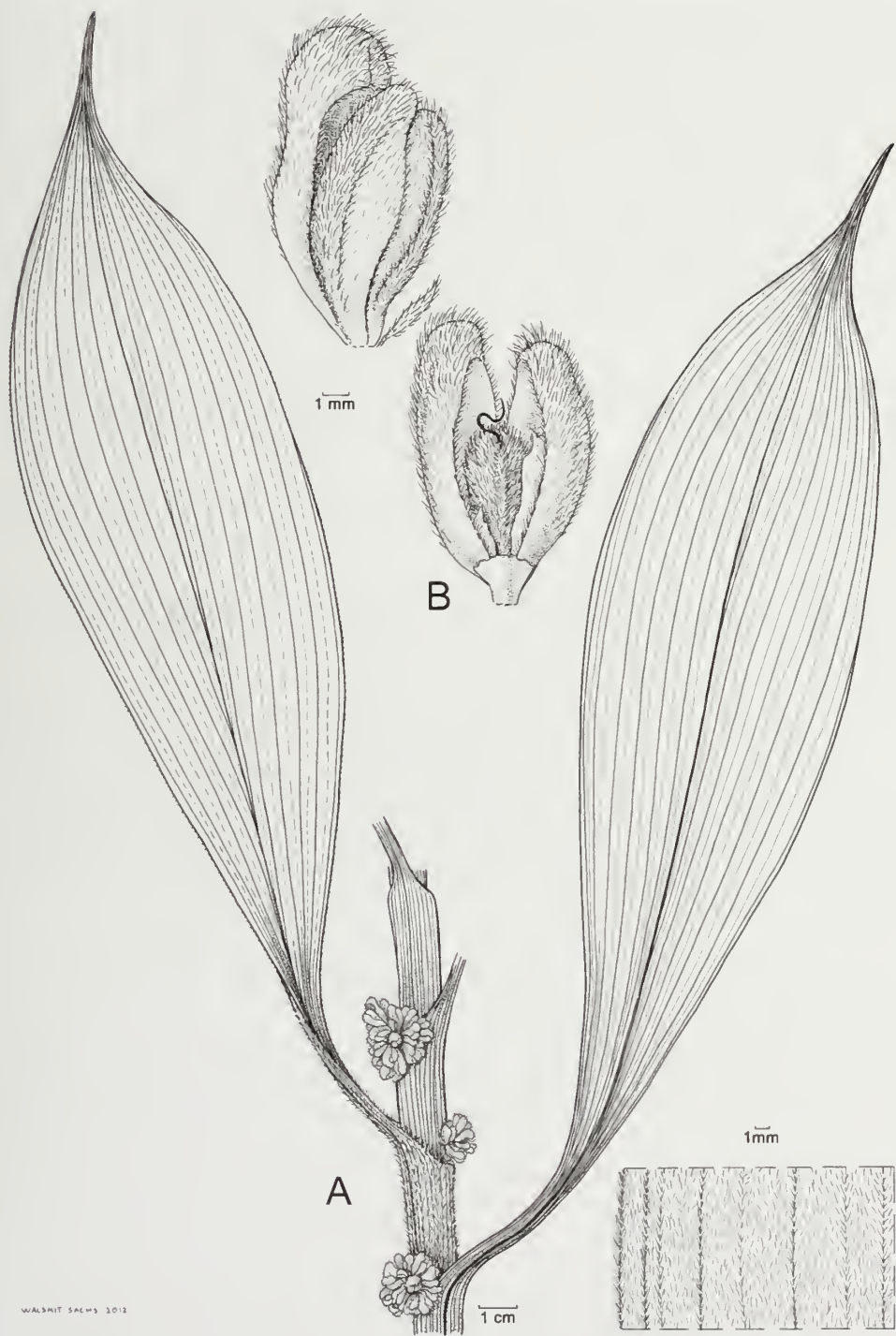


Fig. 1. *Amischotolype barbarossa* Duist. **A.** Habit. **B.** Immature fruit with persistent sepals. Drawing by A. Walsmit Sachs, from *Kiah* 31743 (L).

× 2.5–3.5 mm, not or little elongating in fruit, (pale) pink, moderately to densely 0.5–1.0 mm long orange- to dark red- or brown-hairy at least in upper half, tip hooded. **Petals** 7–8 × 2 mm, much shorter than sepals, translucent (greenish) white, glabrous, margin minutely fringed. **Stamens** with filaments c. 7 mm long, white, in upper part with many 2–2.5 mm long hairs; anthers 1.5 × 0.5 mm, white, thecae opening by a longitudinal slit. **Capsule** 7–10 × 5.5–7 mm, ovoid, 2 mm shorter to 1.5 mm longer than sepals, white to red or lilac, entirely or upper half (rarely only at apex) moderately to rather densely covered in 1–1.5 mm long orange- to red-brown hairs; valves free; apex slightly depressed, lobes absent or up to 0.3 mm long; style remnant 0.5–1.5 × 0.3–0.5 (base) mm, finally deciduous. **Seeds** 2 per locule, aril red.

Distribution. Thailand (Peninsular Thailand: Nakhon Si Thammarat), Peninsular Malaysia (Kedah, Perak, Pahang, Negeri Sembilan, Malacca, Johor), Sumatera (Riau, Jambi).

Ecology. In primary dipterocarp forest, in lighter shaded areas, on dry sandy soil or moist to wet or swampy places. Altitude: 30–250(–800) m asl.

Notes. 1. This species was never recognised as different from *A. mollissima* (Blume) Hassk. Differences from *A. mollissima* and *A. hispida*, both unknown from the Asian mainland, include the 0.5–1 mm long hairs on the internodes, the orange to red (or rarely yellow) hairs on the sheaths, sepals, and capsules, and the submarginal hairs predominantly on the lower surface of the leaf blade.

2. Ridley (1907) gave an accurate morphological description of the species, but unfortunately did not realise the difference from *F. mollis* Hassk., a synonym for *A. mollissima*. He cited only one specimen which is chosen here as the type specimen. The epithet *barbarossa* means red beard and refers to the red hairs on the sheaths, sepals and capsules.

Specimens examined: THAILAND. **Peninsular Thailand:** Nakhon Si Thammarat, Khao Luang, May 1968, *C.F. van Beusekom & C. Phengkhlai* 920 (L).

PENINSULAR MALAYSIA. **Kedah:** Gunung Baling, Nov 1929, *G.A. Best* (SF) 21261 (SING); Baling, Ulu Legong, Kampung Keda, Water Catchment Area, Apr 2006, *K. Imin et al.* FRI 50644 (KEP). **Perak:** Maxwell's Hill, Mar 1892, *H.N. Ridley* 2950 (SING); Temango, Jul 1904, *H.N. Ridley* 13472 (SING); Belum, Sg Sara above Orang Asli village of Ciong, Sept 1993, *I.M. Turner & J.W.H. Yong* 111 (SINU). **Pahang:** Temerluh, Krau GR, Bkt Rengit, Nov 1999, *S. Damhuri et al.* FRI 45316 (KEP); Temerluh, Kemasul FR, Feb 1936, *Ja'amat* 40872 (KEP); near Kuala Teku, Jul 1936, *Kiah* SF 31743 (K, L, SING); Teku river, Gunong Tahan, Jun 1922, *Md.Hamiff & Md.Nnr* SF 8092 (SING); Bukit Belar, Ulu Sungai Tembeling, Mar 1968, *Md.Shah* 1635 (K, KEP, L, SING); Jenka FR, May 1964, *M.E.D. Poore* 1420 (KLU); Jerantut, Gng Aais FR, Sg Lurut, Jul 2004, *Y.Y. Sam* FRI 49056 (KEP); Bentung, Lintang FR, Jun 1934, *C.F. Symington* 40515 (KEP); Jenka FR, Oct 1963, *E.A. Turnan* 908 (K, KLU). **Negeri Sembilan:** Pasoh FR, Nov 1976, *K. Jong s.n.* (KLU); Pasoh F.R. 12 1979, *R. Kiew* 824 (SING); *J.V. LaFrankie* 2024 (KEP, L), Oct 1987, *J.V. LaFrankie* 2530 (KEP); 1989, *J.V. LaFrankie* 4284 (KEP); Jebebu, Pasoh Forest Reserve, Sept 1977, *Mat Asri* FRI 25737 (K, KEP,

L): Petasik Jelebu, Triang Forest Reserve, Jul 1927, *E.A. Strouts 13024* (KEP, SING). **Malacca:** *A.C. Maingay 1712*, p.p. (L); base of Ophir, Jun 1982, *H.N. Ridley s.n.* (SING). **Johor:** north of Gunung Belumat, May 1923, *R.E. Holttum SF 10617* (SING); Gunong Lombak, Nov 1922, *R.E. Holttum SF 9394* (K, SING); Path to Bukit Tangga Tujoh via Kota Tinggi, Aug 1970, *Md.Shah et al. 2085* (L, SING); Genuang, Mar 1915, *H.N. Ridley s.n.* (BM); Seduok, Aug 1908, *H.N. Ridley 14374* (BM, SING); Sungei Juasseh, Labis, Jun 1970, *Samsuri Ahmad 268* (L, SING); Mersing, Endau-Rompin, Ulu Endau, Sept 1985, *R. Kiew s.n.* (KEP). **SUMATERA.** **Riau:** Tigapulu Mountains, Nov 1988, *J.S. Burley et al. 1318* (K, KEP, L, SING); Anak Talang, Oct 1939, *P. Buwalda 7129* (L). **Jambi:** Sri Mengopeh, Sept 1938, *T.W. Rutten-Kooistra 32* (U); P.T.IFA concession, Pasir mayang, Feb 1982, *M.J. Vreeken-Buijs 4* (L).

2. *Amischotolype divaricata* Duist. sp. nov. (Fig. 2)

Amischotolype hookeri similis, internodiis glabris, laminis supra pilis submarginalibus plerumque brevioribus, infra in venibus non conlectis, filamentis (fere) glabris differt. TYPUS: *Larsen et al. 31476*, August 1972, Thailand, NE, Chaiyapum Province, near Chulaphorn Dam, 16°30'N, 101°50'E (holo L; iso KLU).

Stem ascending or decumbent from rhizome, scrambling or winding; erect part 50–300(–600) cm long, simple; internodes glabrous. **Sheath** 7–12 mm diam., at the node with a few or ring of 0.5–1 mm long hairs and/or few lines of 1–3 mm long hairs, mouth ciliate. **Leaf blade** 19–36 × 3.5–6.5 cm, 4.2–6.6 times as long as wide, lower surface (light) green, tinged with purple or striped brown, base gradually narrowed into a winged pseudopetiole 0.5–1.5 cm long and 2 mm wide; lower surface glabrous to moderately 0.2–0.3 mm long hairy or rarely with 2 mm long hairs along midvein, upper surface glabrous or rarely sparsely to moderately 0.2 mm long hairy; submarginal hairs on upper surface, rarely also on margin, 0.2–0.5(–1) mm long, dense, yellow. **Inflorescence** on erect stem, sessile, 2–4.5 cm diam., dense with branches obscure, (10–)15–20(–30)-many-flowered. **Pedicel** absent. **Sepals** 7–10.5 × 3–4.5 mm, not elongating in fruit, light green with pink or violet tip (in flower) to greenish red or purple (in fruit), glabrous or very sparsely 0.2–1.5 mm long ciliate keel and margins, tip hooded. **Petals** c. 8 × 2.5 mm, distinctly shorter than sepals, white, glabrous, margin minutely fringed. **Stamens** with filaments 8.5–10 mm long, white, glabrous or upper 3 mm with 1 mm long hairs; anthers (1.5–)2–2.5 × 0.6–1 mm, white, thecae opening by a longitudinal slit (rarely in upper 2/3 only). **Capsule** 11.5–16 × 6–8 mm, ovoid, longer than sepals by 5–9 mm, dark green to pink or reddish, in upper half to 2/3 sparsely to rather densely 1.5–2 mm long bristle-hairy; valves fused for 1/4 to 1/2 of length; apex acute to obtuse and slightly depressed, lobes absent; style remnant 0.5 × 0.3 mm, persistent. **Seeds** 2 per locule, aril orange.

Distribution. Myanmar (Tenasserim), Lao P.D.R. (Xiangkhouang, Vientiane, Khammouan, Champasak), Vietnam (Central Highlands: Kon Tum; South Central Coast: Khanh Hoa; Southeast: Dong Nai), Cambodia (Pursat, Kampong Speu, Kampot), Thailand (N: Chiang Mai, Phayao; E: Chaiyaphum; C: Nakhon Nayok; SE: Chantaburi, Trat; Peninsular Thailand: Songkhla), Sumatera (N).

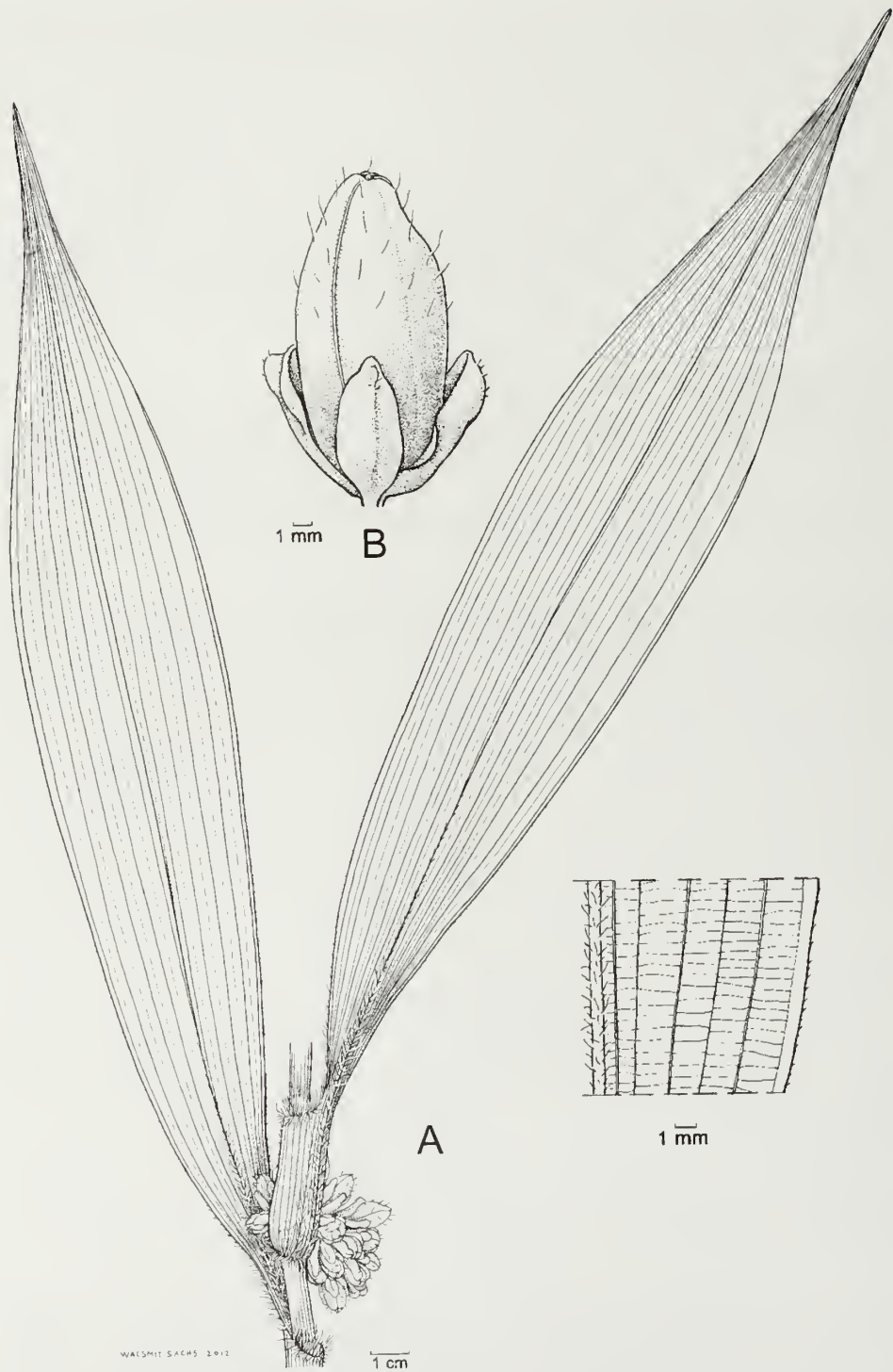


Fig. 2. *Amischotolype divaricata* Duist. **A.** Habit. **B.** Fruit with persistent sepals. Drawing by A. Walsmit Sachs, from *K. Larsen et al. 31476* (L).

Ecology. Rather open primary, disturbed or secondary evergreen (bamboo) or seasonal forest, on damp or moist to marshy places near streams, shaded to almost in full sun: on white sand with large rocks, sandstone, granite or shale bedrock. Altitude: 50–1225 m asl.

Notes. The epithet refers to the scrambling habit of the plant. The species is similar to and until now (mis)identified as *A. hookeri*, but differs in the glabrous internodes, the generally shorter submarginal hairs on the upper surface (and margin) of the leaf blade, the hairs on the lower surface of the leaf blade not concentrated on the veins, and the (almost) glabrous filaments. Hara (1966), Hong (1974, 1997) and Hong & DeFilipps (2000) mention *A. hookeri* for the Chinese province of Yunnan. I have not seen their specimens and their descriptions are wide enough to include both species. Study of the specimens from Yunnan is needed to elucidate which of the two taxa are present.

Specimens examined: MYANMAR. **Tenasserim:** Tavoy distr. Oct 1961, *Keenan et al.* 1604 (E);

LAO P.D.R. **Xiangkhouang:** Xieng-Khouang, 1926, *M. Delacour s.n.* (P). **Vientiane:** Phon Kheng, Apr 1953, *J.E. Vidal* 2301 (P); route du Phou Khao Khouay, Oct 1965, *J.E. Vidal* 4041 (P); Phou Khao Khouay, Oct 1971, *J.E. Vidal* 5547 (P). **Khammouan:** Boneng-Thakhek, Apr 1950, *J.E. Vidal* 1274 (P); Nyalak, Oct 2005, *M.F. Newman et al.* LAO 530 (L); Tha Phabat Distr., Path to Tad Leuk Waterfall, May 2006, *M.F. Newman et al.* LAO 1539 (L. P); Nakai Oudom Souk, Apr 2005, *B. Svengsuksa et al.* BT 32 (L). **Champasak:** Boloven plateau, entre Noug Bok Kao et Phong, Oct 1928, *E. Poilane* 15837 (P).

VIETNAM. **Central Highlands:** Kon Tum, nr Kontum, entre Ta Bai et Giang Lo, Sep 1930, *E. Poilane* 18284 (P). **South Central Coast:** Khanh Hoa, sur le bas Song Cao et le Song Cay, pres Nhatrang, Jul 1921, *F. Evrard* 571 (P); **Southeast:** Dong Nai, Bien Hao, ?Gioray, Jul 1919, *E. Poilane* 186 (P); Dong nai, nord de Blao Kil, Haut Donai, Oct 1931, *E. Poilane* 19869 (P); Dong nai, Blao, du Haut-Donai, Apr 1933, *E. Poilane* 22419 (P). Cochinchine. Déon bu., Apr 1866, *L. Pierre s.n.* (P); Cochinchine, Camchoy, *L. Pierre* 11 (P); Cochinchine, 1862–1866, *Thorel s.n.* (several in P); MeKong, Sep 1874, *Harmand* 1920 (P); Dalat, Oct 1924, *F. Evrard* 1467 (P).

CAMBODIA. **Pursat:** 1876, *Harmand* 3366 (P). **Kampong Speu:** Kompong Spen, Sep 1870, *L. Pierre s.n.* (several in P). **Kampot:** Phnom Bokor, Dec 1965, *M.A. Martin* 815 (P). Mt.Kam Chay, Poporkville waterfall, Mar 1970, *B.C. Stone* 9302 (KLU).

COCHINCHINE. 1862–66, *Thorel* 1139 (P).

THAILAND. **N:** Chiang Mai, Doi Sutep, east side, Pah Laht, Jul 1987, *J.F. Maxwell* 87-729 (L); Phayao, Doi Luang NP, E-side, Jahm Bah Tawng Falls, May 1997, *O. Petrmitt* 15 (L). **E:** Chaiyaphum, nr Chulaphorn Dam, Aug 1972, *K. Larsen et al.* 31476 (KLU. L). **C:** Nakhon Nayok, Muang, Kow Yai NP, summit ridge E-side, Kow Kieo, Jul 2003, *J.F. Maxwell* 03-160 (L). **SE:** Chantaburi, western slopes of Kao Sabab, Feb 1935, *G. Seidenfaden* 2825 (SING); Chantaburi, foot of Khao Soi Dao, Nov 1969, *C.F. van Beusekom & T. T. Smitinand* 2064 (E. L); Trat, Klawng Yai, *T. Smitinand* 269 (E); Trat, Haui raeng, Dong tapit, *T. Smitinand* 1378 (E). **Peninsular Thailand:** Songkhla, Na Tawee, Jul 1928, *G. Rahil* 81 (L). Sapi foot, Apr 1922, *Put* 798 (L); Chantaboon?, 1936?, *A. Vesterdal* 7-P (SING).

SUMATERA. **Sumatera Utara:** ENE Sibajak, Oct 1928, *J.A. Loerzing* 14103 (L).

3. *Amischotolype dolichandra* Duist. sp. nov. (Fig. 3)

Amischotolype glabrata similissima, sepalis 7.5–9 mm longis, filamentis glabris, antheris 3 mm longis, capsulae valvibus liberis differt. TYPUS: Koelz 26448, 1950, India, Manipur, Karong, 1050 m alt., in deep forest, scandent (holo L).

Stem rhizome unknown, scrambling; erect part c. 90 cm long, with c. 40 cm long aerial (stilt) roots, simple; internodes glabrous. **Sheath** 8–11 mm diam., with 0.3–0.5 mm long hairs in upper third to half of the frontal part, mouth ciliate. **Leaf blade** 18–19 × 2.7–4.1 cm, 4.6–6.7 times as long as wide, base gradually narrowed into an indistinct winged pseudopetiole to 0.5 cm long and 2 mm wide; lower surface glabrous or moderately 0.5 mm long hairy, upper surface glabrous; submarginal hairs on upper surface, 0.8–1.5 mm long, dense, yellow. **Inflorescence** on erect stem, sessile, 1.6–1.7 cm diam., dense with branches obscure, 5–10-flowered. **Pedicel** absent. **Sepals** 7.5–9 × 3–3.5 mm, possibly slightly elongating in fruit, pink, glabrous or sparsely 0.3 mm long ciliate margins, tip hooded. **Petals** c. 9.5 × 3 mm, slightly longer than sepals, colour unknown, glabrous, margin minutely fringed. **Stamens** with filaments c. 9 mm long, colour unknown, glabrous; anthers 3 × 0.7 mm, colour unknown, thecae opening by a longitudinal slit. **Capsule** 6.5 × 5 mm, obovoid, shorter than sepals by c. 2 mm, pink, moderately 1.5 mm long hairy; valves free; apex obtuse, lobes absent; style remnant 1.2 × 0.4 mm, persistent. **Seeds** 2 per locule, aril colour unknown.

Distribution. India (NE: Meghalaya, Mizoram, Manipur).

Ecology. Deep forest. Altitude: 1050–1200 m asl.

Notes. The epithet refers to the strikingly long anthers. The species most closely resembles *A. glabrata* which has a much wider distribution, and has longer sepals, stamens with hairy filaments and much shorter anthers, and capsules with basally fused valves.

Specimens examined: INDIA. NE. **Meghalaya:** Khasi Hills, Cherapunjee, Jun 1952, *Thakur Rup Chand* 5921 (L) & 5944 (L). **Mizoram:** Tengawl, Lushai Hills, Nov 1927, *N.E. Parry* 286 (K). **Manipur:** Karong, Oct 1950, *W.N. Koelz* 26448 (L).

4. *Amischotolype glabrata* Hassk. (Fig. 9A & 11C–D)

Amischotolype glabrata Hassk., *Flora* 46 (1863) 392; Coode et al., *Checklist Fl. Pl. Gymn. Brun. Dar.* (1996) 352; Turner, *Gard. Bull. Sing.* 47 (1997) 515; Beaman & Beaman, *Plants of Mount Kinabalu*, 3 (1998) 109. — *Campelia glabrata* auct., sensu Hasskarl in Miquel, *Pl. Jungh.* (1852/53) 154; Miquel, *Fl. Ned. Ind.* 3 (1855) 546; non Kunth, *Enum. pl.* 4 (1843) 109 (see note 2). — *Forrestia glabrata* (Hassk.) Hassk., *Flora* 47 (1864) 630; Commelin. *Ind.* (1870) 94; Clarke, *Commelyn. Cyrtandr. Bengal.* (1874) 62, tab. XLII; Clarke in A.Candolle & C.Candolle, *Monogr. Phan.* 3 (1881)



Fig. 3. *Amischotolype dolichandra* Duist. **A.** Habit. **B.** Fruit with persistent sepals. Drawing by A. Walsmit Sachs, from *W.N. Koelz* 26448 (L).

238; Hooker f., Fl. Brit. India 6 (1894) 384; Koorders, Excursionsfl. Java 1 (1911) 282; Hallier f., Nova Guinea 8 (1913) 906; Ridley, Fl. Malay. Penins. 4 (1924) 360; Ridley, J. Bot. 63 (1925) 124; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169. — *Forrestia mollissima* (Blume) Koord. forma *glabrata* (Hassk.) Backer, Handb. Fl. Java I, 3 (1924) 33, *p.p.*; Backer & Bakhuizen van den Brink, Fl. Java 3 (1968) 15, *p.p.* — *Forrestia mollissima* (Blume) Koord. var. *glabrata* (Hassk.) Subba Rao & Kumari, Bull. Bot. Surv. India 12 (1970) 209 (*nom. inval.*: Vienna Code Art. 33.4, no full reference to basionym). LECTOTYPE (designated here): *Junghuhn s.n.*, Java: Ungaran prope Medini (L: L0041658). Other syntypes: *Junghuhn s.n.*, Java: Merapi (L), Gede et Tangkuban prau (L).

Campelia marginata var. B Blume, Enum. Pl. Javae (1827) 7; Kunth, Enum. Pl. 4 (1843) 109; Miquel, Fl. Ned. Ind. 3 (1855) 547 ('var. *foliis minoribus margine subtus tantum ciliolatis*'). TYPE: *Zippelius s.n.*, Java (L).

Forrestia glabrata (Hassk.) Hassk. forma *minor* Hassk., Flora 47 (1864) 631; Hasskarl, Commelin. Ind. (1870) 94. — *Campelia* n. sp., Moritz, Syst. Verz. (1845–46) 93; Zollinger, Syst. Verz. (1854) 65. SYNTYPES: *Nagler s.n.*, 1858, Java (photo B: Barcode: B 10 0296343 / ImageId: 302936); *Blume s.n.*, *s.d.*, Java, Preanger ad ped. mnt. Pangerangoh prop. Tjipanwar (L); *Zollinger* 305, Java, *Tjapus* (photo B: Barcode: B 10 0296344 / ImageId: 302937); *Zollinger s.n.*, 23 Oct 1858, Java, *Idjen* (L).

Forrestia chinensis N.E.Br. in Forbes & Hemsley, J. Linn. Soc., Bot. 36 (1903) 158; Walker, Fl. Okinawa & S Ryukyu Isls. (1976) 298. — *Amischotolype chinensis* [E.H. Walker ex Hatusima, Fl. Ryukyus (1971) 771, *nom. inval.*: see note 4] ex K.-S. Hsu, Fl. Taiwan 5 (1978) 158, t. 1305. SYNTYPES: *Oldham* 578/1 (P); *Henry* 149, 1618A, 8670 (all BM or K, *n.v.*); *Ford* 256 (BM or K, *n.v.*).

Tupistra cavaleriei H.Lév., Repert. Spec. Nov. Regni Veg. 10 (1912) 372; McKean, Notes Roy. Bot. Gard. Edinburgh 45, 1 (1988) 153, in syn. *A. hispida*. SYNTYPES: *Jul. Cavalerie* 2565, 3517, China, Guizhou ('Kweichow'), Lo-Fou (photo: E).

Forrestia sumatrensis Ridl., J. Malayan Branch Roy. Asiat. Soc. 1 (1923) 102. TYPE: *Ridley s.n.*, 8 Feb. 1921, Sumatera, Berastagi Woods (holo K). (See note 5).

Forrestia hispida auct., *sensu* C.B. Clarke in A. Candolle & C. Candolle, Monogr. Phan. 3 (1881) 236, *p.p.* — *Amischotolype hispida auct.*, *sensu* Hong, Acta Phytotax. Sin. 12, 4 (1974) 461; McKean, Notes Roy. Bot. Gard. Edinburgh 45, 1 (1988) 153; Hong in Wu, Fl. Reipubl. Pop. Sin. 13, 3 (1997) 71; Hong & DeFilipps, Fl. China 24 (2000) 22; Wang, Chen & Peng, Fl. Taiwan, 2nd ed., 5 (2000) 153; Yang, Liu & Lin, Man. Fl. Taiwan 5 (2001) 56, pl. 103; Yuan and Yang, Bot. J. Linn. Soc. 152 (2006) 400; *non* A. Rich. (See note 3).

Stem ascending from short rhizome or basally decumbent and with long roots, scrambling; erect part 50–200 cm long, sometimes with aerial (stilt) roots, simple; internodes glabrous or moderately to densely 0.1–0.3 mm long hairy. **Sheath** (6–)8–12 mm diam., glabrous or at its front moderately 0.3–0.5(–1) mm long hairy or with one or a few lines of 1–3 mm long hairs, mouth ciliate or rarely glabrescent. **Leaf blade** 15–28 × 3.2–6.5(–8.3) cm, 3–4.5(–6.3) times as long as wide, smooth, lower surface sometimes red, base gradually to abruptly narrowed into a winged pseudopetiole up to 2.5 cm long and 1 mm wide; lower surface glabrous or rarely sparsely to densely 0.1–0.5(–2) mm long hairy or 2 mm long hairy on midvein, upper surface glabrous or rarely very sparsely to moderately 1 mm long hairy; submarginal hairs on lower surface, rarely (also) on margin or upper surface, 0.2–0.5(–1) mm long, rather dense, colourless to yellowish. **Inflorescence** on erect stem, sessile, 1.5–4 cm diam., dense with branches obscure, (5–)10–20(–25)-flowered. **Pedicel** absent. **Sepals** (9–)10–14.5 × (1.5–)2–3(–4.5) mm (in fruit), (dark) green, pinkish purple or dark violet, sometimes base white, probably not elongating in fruit, sparsely to moderately 0.2–1.5 mm long colourless- or orange-ciliate keel or rarely glabrous, tip hooded. **Petals** c. 8 × 3 mm, as long as sepals, white, glabrous, margin entire. **Stamens** with filaments c. 11 mm long, white, upper half with 1–3 mm long hairs; anthers 0.6–1 × 0.5–1 mm, deltoid, white, thecae opening by a longitudinal slit. **Capsule** 5–8 × (3.5–)4.5–6.5 mm, obovoid, shorter than sepals by (1–)2.5–5(–6) mm, at first white and later turning to green and finally red, upper half sparsely to moderately 1–2.5 mm long hairy or rarely glabrous; valves fused for 1/3 to 1/2 of length; apex obtuse, lobes absent; style remnant 1–3 × 0.3–0.5 mm, persistent. **Seeds** 2 per locule, aril orange.

Chromosomes. 2n = 36 (Yuan & Yang 2006).

Distribution. Pakistan (E: Sind), India (Sikkim, Meghalaya, West Bengal, Assam), China (Guizhou, Yunnan, Guangxi Zhuang, Hainan), Taiwan, Japan (Ryukyu Isl.), Vietnam (Tonkin, Lang Giu, Ninh Binh), Myanmar (Tenasserim), Thailand (N: Chiang Mai, Chiang Rai, Lampang), Peninsular Malaysia (Kedah (Bukit Telim), Pahang (Cameron Highlands), Selangor (Ulu Langat)), Sumatera (Toba, Talang, Karo plateau, Sago, Singalang, Asahan), Borneo (Sabah: West Coast), Java (West: Preanger, Salak, Bandoeng, Batavia, Bogor, Talaga-bodas, G.Patoeka, G.Tiloe; Central: Ungarang; East: Mount Idjen, Besoeki, Pasoeroean), Nusa Tenggara: Lombok (Rindjani-vulcano).

Ecology. Primary or disturbed (mountain, oak-laurel) evergreen, mixed or deciduous (monsoon) forest, often near stream, on dry to moist sandy or loamy soil, limestone, granite or andesite breccia, shaded. Altitude: (75–)210–1850 m asl.

Notes. 1. This is the most widespread species of the genus. It is the only species occurring in Pakistan, China, Taiwan, and Japan.

2. As Hasskarl (1863) noted, *Campelia glabrata* as used in Asian literature is not based on Kunth (1843). The inflorescence in Kunth's original material in B

(Barcode: B 10 0184765 / ImageId: 245454), *Kunth s.n.* (Febr. 1833, Hortus Berol.), has a long peduncle with two leaf-like bracts at the apex enclosing the flowers, whereas the Asian material has very condensed inflorescences. The genus *Campelia* is restricted to the American continent, and is now united with *Tradescantia* (Hunt 1986).

3. This species has often been referred to as *A. hispida*, a confusion that started with Hooker (1864) who mentioned the species is distributed from New Guinea to India. Since that time onward, the name *hispida* has been in use for continental Asian material (e.g. Hong & DeFilips 2000), most of which should be identified as *A. glabrata*. Both *A. hispida* and *A. glabrata* have capsules distinctly shorter than the sepals with valves fused in the basal part. Differences include position and length of submarginal hairs (with slight overlap), presence of pedicel, length of hairs on capsule (with some overlap), length of anthers, shape of capsule apex, and length of style remnant. The species co-occur only on Borneo. However, *A. hispida* has been found only in E and SE Kalimantan, whereas *A. glabrata* has only been found in the mountainous areas of Sabah.

4. *Amischotolype chinensis* E.H. Walker ex Hatusima is invalid because reference to the basionym was incomplete and indirect (McNeill et al. 2006, Art. 33.4). Hsu (1978) was the first to validate the name. Of the type material I have only seen *Oldham 578/1*, which has submarginal hairs on the upper surface, a state that is only rarely seen in other specimens of *A. glabrata*. However, Brown's original description in Forbes & Hemsley (1903) agrees with the present delimitation of *A. glabrata*. The illustration in Hsu (1978) clearly shows the persistent style remains; the fruit, however, is depicted with four valves instead of three.

5. Ridley (1923) did not cite specimens when he described *F. sumatrensis*, he just mentioned that it was found in Berastagi woods (Sumatera). There is only one collection of Ridley (K) that fits his description with matching locality, which should therefore be the holotype. Ridley (1923) mentioned that the stamens are "apparently quite glabrous". Unfortunately, these could not be checked from the photo. The filaments of other Sumatran material (*Bartlett 6612*) are not glabrous, but compared to material from other regions they are much less hairy and with shorter hairs. In the present treatment this is regarded as variation within the species.

Specimens examined: PAKISTAN. E: Chittagong Hill Tracts, between Langlagklopara and Kairwa, Jan 1965, *M.S. Khan 952* (K).

INDIA. **Sikkim:** *J.D. Hooker f. & T. Thompson s.n.* (K, L); E. Himalaya, Rongbe, Jul 1913, *G.H. Cave s.n.* (E). **Meghalaya:** Khasia, Shillong, Oct 1872, *C.B. Clarke 19048* (BM); Shillong, Aug 1886, *C.B. Clarke, 44390A* (BM). **West Bengal:** Darjeeling, Rishap, Aug 1870, *C.B. Clarke 12518* (K, BM); Darjeeling, Oomong, Oct 1870, *C.B. Clarke 13645* (K); Darjeeling, Jun 1893, *Cowan s.n.* (E). **Assam:** Garo Hills, Tura Mountain, 1929, *N.E. Parry 809* (K).

CHINA. **Guizhou:** Lo-Fou, Aug 1909, *J. Cavalerie 2565* (E) & *3517* (P, E); 1936, *S.W. Teng 90984* (L). **Yunnan:** *A. Henry 10884* (E) & *12204* (E) & *13377* (E). **Guangxi Zhuang:** Na Pao Kou, San Chiang Hsien, Sep 1933, *A.N. Steward & H.C. Cheo 1101* (P). **Hainan:** Fung Sheung Tsuen, Ngai distr, Aug 1932, *Lan 427* (P, E); Chim Fung Mt., Feb 1935, *Lan 5422* (E); Yaichow, Aug 1933, *Liang 62393* (E).

TAIWAN. Mt Arisan, Aug 1914, *S. Kawagoe s.n.* (L); Tamsui, 0, 1864, *R. Oldham 578/1* (P);

Taipei Hsien, Pingling Hsiang, Taiyuku, Nov 1992, *Liu et al.* 21 (E).

JAPAN. **Ryukyu Isl.**: Okinawa, Kunigami, Taminato Ugan, Jul 1951, *E.H. Walker et al.* 6130 (L); Okinawa, Motobu Peninsula, foot of Mt Awa, Dec 1953, *E.H. Walker* 7607 (L); Nantou Co., Sun-Moon-lake, Aug 1972, *C.-S. Kuoh* 3882A (L).

VIETNAM. ?Dalat, ?Adran, Nov 1953, *N. Schmid s.n.* (P). **Tonkin**: Mont-Baui(?), Jun 1886, *B. Balansa, B.* 4100 (P); Tien-yen, Ho Yung Shan and vicinity, 1940, *W.T. Tsang* 30748 (E, P, SING). **Lang Giu**: Than Mai, 1916, *Eberhardt* 3277 (P). **Ninh Binh**: Cuc Phuong NP, Nov 1998, *D.D. Soejarto et al.* 10380 (L); Cuc Phuong NP, site CP71, Jul 1999, *N.M. Cuong* 300 (L); Nho Quan District, Cuc Phuong NP, Dec 1999, *D.D. Soejarto et al.* 11318 (L).

MYANMAR. 1885, *R.H. Beddome* 8001 (BM). **Tenasserim**: Tavoy distr, Aug 1961, *J. Keenan et al.* 715 (E); Aug 1961, *J. Keenan et al.* 1048 (E).

THAILAND. N: **Chiang Mai**: Doi Angka, E. slope nr rivulet, Oct 1927, *H.B.G. Garrett* 483 (L); Doi Chiang Dao, E foothills, Pa Blawng Cave area, Oct 1989, *J.F. Maxwell* 89-1287 (L). **Chiang Rai**: Ban Pa Deuah, Bah Sahng subdistrict, Feb 1991, *J.F. Maxwell et al.* 98 (L). **Lampang**: Jae Sawm NP, Wahng Die, Pah Ngahm (Nahn Kaht) cave, Jan 1996, *J.F. Maxwell* 96-76 (L).

PENINSULAR MALAYSIA. **Kedah**: Bukit Telim, Nov 1908, *H.N. Ridley* 13892 (BM, K, SING). **Pahang**: Cameron Highlands, Boh plantation, Apr 1937, *Md.Nur SF* 32944 (SING). **Selangor**: Ulu Langat, 1912, *C.B. Kloss s.n.* (K).

SUMATERA. *P.W. Korthals s.n.* (L). **Sumatera Utara**: Berastagi Woods, Feb 1921, *H.N. Ridley s.n.* (K); Brastagi, Dec 1921, *E.M. Burkill* 30 (SING); N of Berastagi, Deleng Sing., Feb 1927, *H.H. Bartlett* 6612 (L); plateau above Berastagi, Jan 1929, *J.A. Loerzing* 15073 (L); Asahan, East Coast, Aek Si Tamboerak, Oct 1936, *Rahmat Si Boeea* 10647 (L); vic. Taloen na Oeli, nr headwaters Aek Mandosi, Nov 1936, *Rahmat Si Boeea* 10952 (L). **Sumatera Barat**: G.Singalang, May 1918, *H.A.B. Buennemeyer* 2588 (L); Mt.Talang, Jul 1953, *J. van Borssum Waalkes* 2796 (L, SING). N slope of Mt Sago, Pajakumbuh, Air Kesimbultan, Mar 1955, *W.J.C. Meijer* 3654 (L).

BORNEO. **Sabah**: West Coast: Kinabalu, Menteki River, *J.H. Beaman et al.* 10785 (K); Kota Belud, Kinabalu, Golf Course Site, Oct 1983, *J.H. Beaman et al.* 7205 (L); Kota Belud, Mount Kinabalu, Penibukan, Dahobang falls, Jan 1933, *J. & M.S. Clemens* 30681 (L, BM); Kota Belud, Mt Kinabalu, Penataran basin, Jul 1933, *J. & M.S. Clemens* 34200 (L, BM); Kota Belud, Kinabalu, Penataran River, Jul 1933, *J. & M.S. Clemens* 34272 (BM); Ranau, Kundasan, Nov 1957, *Kidinan Cox* 951 (L); Ranau, S slope Kinabalu, Penosok plateau, Sungai Mesilau, Jul 1963, *H.P. Fuchs et al.* 21111 (L); Ranau, Mt.Kinabalu, Mesilau camp, Jan 1964, *W.L. Chew & E.J.H. Corner* 4001 (SING, L); Ranau, Kinabalu, Pinosok plateau, 1964, *M.E.D. Poore* 3863 (L); Kota Belud, Kinabalu NP, along road between HQ and Tenumpok, Jan 1969, *S. Kokawa & M. Hotta* 3095 (L); Ranau, Mesilau trail few trails from road, Sep 1972, *J.L. Chow SAN* 76433 (L, SING); Ranau, Kinabalu, West Mesilau River, Nov 1983, *J.H. Beaman et al.* 7452 (L, K); Ranau, Kinabalu, West Mesilau River, Feb 1984, *J.H. Beaman et al.* 8637 (L); Penampang, Penampang: Crocker Range, Mar 1984, *J.H. Beaman et al.* 8849 (L); Tambunan, km 63 KK-TambunanRd, Jul 1984, *Amin et al. SAN* 60351 (SAN, L); Ranau, Kundasang, Melisau, Mar 1985, *A. Zuraidah bt* 0027/7195 (SAN); Ranau, S.Bambangan, Sep 1988, *Amin et al. SAN* 123564 (SAN); Tambunan, Kawasan simpanan Rafflesia, Jul 1989, *Norhayati Sandapali* 03 (SAN); Ranau, Kampong Bundu Tuhan, Sep 1992, *S. Doinis* 24 (KEP); Kota Belud, Mt.Kinabalu, halfway along Liwagu Trail, Feb 1995, *K.M. Cameron s.n.* (K); Kota Belud, Kinabalu Park, Mountain Garden, Jul 2005, *H. Duistermaat* 392 (L, SING).

JAVA. *Kuhl & v.Hasselt s.n.* (L). **Jakarta**: Pasir Limoes (Boerangrang), Jul 1920, *R.C. Bakhuizen van den Brink sr.* 4367 (L). **Jawa Barat**: *A. Zippelius s.n.* (L); Salak, *A. Zippelius*

s.n. (2269a) (L); Gedeh, *F.W. Junghuhn s.n.* (L); Pangerangoh, nr Tjipanjawar, *C.L. Blume s.n.* (L); Tjibodas, *J.G. Boerlage s.n.* (L); tussen Tjibodas en Tjikeureum, *S. Bloembergen* 86 (L); G.Patoeka, *P.W. Korthals s.n.* (L); Pangerango, supra Tjibodas, Apr 1894, *V. Schiffner* 1692 (L); Tjibodas, Oct 1896, *S.H. Koorders* 26031B (K); Tjigenteng, Jan 1897, *S.H. Koorders* 26329B (L); Tjibodas, Oct 1898, *S.H. Koorders* 31912B (L); Tjibodas, 1905, *R.H.C.C. Scheffer s.n.* (L); WZW van Buitenzorg, Nirmala, Dec 1913, *C.S. Backer* 10673 (L); Tjiboden, 1915, *Sapiin* 450 (SING); Tjibodas, 1915, *Sapiin* 2037B (L, U); G.Beser, May 1917, *W.F. Winckel*, *W.F.* 28 (L); Tjadas, Malang-Tjidadap, Tjibeber, Jun 1917, *R.C. Bakhuizen van den Brink sr.* 1935 (L); Talaga-bodas, *P.W. Korthals s.n.* (L); G.Djaja, Mar 1920, *H.J. Lam* 166 (L); G. Perbakti, Sep 1922, *R.C. Bakhuizen van den Brink Jr.* 1729 (U); G.Tiloe, Rioeng goenoeng, Jan 1927, *J.H. Coert* 575 (L); Tjibodas, Dec 1932, *W.J.C. Kooper s.n.* (U); Gedeh, Tjibodas, Apr 1932, *A. Kloos* 38 (L); voetpad Tjibodas-Tjibeureum, Jan 1939, *C. Holstvoogd*, *C.* 210 (L); Tjisaroea, Feb 1950, *S.J. van Ooststroom* 12843 (L). **Jawa Tengah:** Ungarang, prope Medini, *F.W. Junghuhn s.n.* (L); Djati-Kalangan, *Waitz* (845') (L). **Jawa Timur:** Banyuwangi: Mount Idjen, Oct 1858, *H. Zollinger s.n.* (L); Besoeki, Banjoelinoe-Kalibendo, Jul 1916, *S.H. Koorders & A. Koorders-Schumacher* 40490B (L); Pasuruan, N...kadjadja, May 1923, *J. Dorgelo* 513 (L); Ranse Pani near Sendoero, Feb 1934, *J.H. Coert* 1120 (L). **NUSA TENGGARA. Lombok:** Rindjani-vulcano, SO-seite, Sappittal, Pussu, Jun 1909, *J. Elbert* 1799 (L); Rindjani-Vulkangebirge, Sapittal, S-side Pussuk, Jun 1909, *J. Elbert* 1839 (L, SING).

5. *Amischotolype gracilis* (Ridl.) I.M.Turner (Fig. 9B, 11E–F & 12A–D)

Amischotolype gracilis (Ridl.) I.M. Turner, Gard. Bull. Sing. 45 (1993) 53, 47 (1997) 515. Keng et al., Conc. Fl. Sing. Volume II: Monocotyledons (1998) 23. — *Forrestia gracilis* Ridl., J. Straits Branch Roy. Asiat. Soc. 41 (1904) 37; Mat. Fl. Malay. Penins. 2 (1907) 123; Fl. Malay. Penins. 4 (1924) 359; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169; Keng, Gard. Bull. Sing. 40 (1987) 124. LECTOTYPE (designated here): *Ridley* 2381, Pulau Tijau (SING). Other syntypes: *Cantley's Coll.* (*Curtis s.n.*, Kwala Lumpor; *Alvins Y.H.* 2020, Gunong Bumbon) (SING); *Ridley* 2382, 6320, 10512 (all SING); *Ridley* 4130 (n.v.), *Walker* 155 (BM, n.v.).

Forrestia hispida auct., sensu Hooker f., Bot. Mag. 90 (1864) t. 5425; non A.Rich.

Forrestia mollis auct., sensu C.B.Clarke in A.Candolle & C.Candolle, Monogr. Phan. 3 (1881) 236, p.p. (*Walker* 155); Hooker f., Fl. Brit. Ind. 6 (1894) 383, p.p.; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 170; non Hasskarl, Flora 47 (1864) 628, nom. superfl. (= *A. mollissima* (Blume) Hassk.); non Ridley, Mat. Fl. Malay. Penins. 2 (1907) 124; J. Malayan Branch Roy. Asiat. Soc. 1 (1923) 103; Fl. Malay. Penins. 4 (1924) 360 (= *A. barbarossa* Duist. sp. nov.).

Stem ascending from short creeping rhizome; erect part 90–250(–300) cm long, often with short or long stilt roots, simple; internodes glabrous. **Sheath** (4–)6–11(–13) mm diam., glabrous or rarely with 1 or a few lines of 0.5–2 mm long hairs, mouth ciliate or rarely glabrous. **Leaf blade** (16–)20–35(–45) × (3.5–)4–7(–8.7) cm, (3.3–)4–6(–7.3)

times as long as wide, smooth. lower surface green to dark purple. upper surface green or variegated with silver-white (see note 3), base gradually to abruptly narrowed into a winged pseudopetiole up to 5.5 cm long and 1–3 mm wide; lower surface glabrous or sparsely to densely 0.1–1 mm long hairy, upper surface glabrous or rarely sparsely 0.1–0.3(–0.5) mm long hairy; submarginal hairs on upper surface. (0.7–)1.5–2.5 mm long, (rather) dense, (yellow-)orange to red-brown. **Inflorescence** on erect stem. sessile, 1.5–3.5 cm diam., (rather lax to very) dense with branches obscure or up to 3(–6) mm long, 5–15-flowered. **Pedicel** 0–1 mm long. **Sepals** 4.5–7 × 2.5–4.5 mm, not elongating in fruit, white to green in flower, green to purplish in fruit. margins and keel or entirely sparsely to moderately (0.1–)0.2–0.5 mm long hairy or rarely glabrous. tip hooded. **Petals** 4–7 × 2–3 mm, not to slightly longer than sepals, white. glabrous or with few 0.2 mm long hairs at midvein near apex. margin entire or minutely fringed at apex. **Stamens** with filaments 3–7 mm long, white to pale yellow, in upper 0.5–3 mm with many 1.5–2 mm long, white hairs; anthers 1.0–1.8 × 0.5–0.7 mm, white to pale yellow, thecae opening by an apical pore or a longitudinal slit 0.3–1.8 mm long. **Capsule** 7–11(–14) × 4.5–8 mm. obovoid. white to purplish red. purple or rarely green. longer than sepals by (2.5–)4–6(–7) mm. upper 1/3 partially to entirely rather sparse to moderately 0.7–1.5 mm long white- to yellow-hairy (hairs longest at apex); valves free; apex slightly depressed, lobes absent; style remnant 0.8 × 0.2–0.4 mm, finally deciduous. **Seeds** 2 per locule (rarely 1 and double-sized, or 1 abortive), aril orange. rarely containing 2 seeds.

Distribution. Peninsular Malaysia (Kedah. Kelantan. Terengganu. Perak. Pahang. Selangor. Negeri Sembilan. Malacca. Johor), Singapore, Sumatera (Aceh. Anambas Natuna Islands. Jambi. Palembang), Borneo (Sarawak: Kuching; see note 2).

Ecology. In rather dry to wet or swampy, primary or recently logged-over, lowland, mixed, dipterocarp or montane rain forests. rarely in *kerangas* or peat swamp forest. in dry streambeds and on slopes; partly shaded; on granite, clay, and alluvial soil. Altitude: 0–1350(–1500) m asl.

Notes. 1. As Ridley (1904) noted, this is the most common species of the genus in Peninsular Malaysia and Singapore. Earlier authors included it in *Forrestia mollis* (but see also *A. barbarossa*), an illegitimate name as Hasskarl (1864) based it on *Campelia mollissima* Blume. It is most obviously different from *A. gracilis* in having capsules much shorter than the sepals and with apical lobes.

2. The species is known from Borneo from only two collections, both from Sarawak. Another specimen is close to this species but deviates from the above description in having 2 mm long hairs on the upper surface of the leaf blade (S [S.T.Lai] 54495; SAR n.v., KEP, L).

3. Material from disturbed forest along Jalan Gombak, Selangor. Peninsular Malaysia, has silver-white variegated leaf blades (*Duistermaat* 353; Fig. 1E). The variegation slowly disappeared when the plant was grown in the greenhouse.

Specimens examined: PENINSULAR MALAYSIA. **Kedah:** Sungai Batang, Mar 1938, *Sow* 34656 (KEP); Baling, Lata Mengkung, Dec 1990, *Khairuddin Hj. Itam* 8 (KEP); Baling, Ulu Legong, Kampung Keda, Water Catchment Area, Apr 2006, *K. Imin et al. FRI 50645* (KEP, L); Baling, G. Inas FR, Bkt Iboi, Apr 2008, *M. Kamarul Hisham et al. FRI 59170* (KEP). **Kelantan:** Chaning Woods, Feb 1917, *H.N. Ridley s.n.* (K); Ulu Sungei Ketil, Mar 1972, *Md.Shah* 2588 (KEP, SING); Bukit Berangkat Reserve, via Kpg. Perak Bertam, Feb 1973, *Md.Shah & Md.Ali* 2862 (KEP, SING); Sg. Lebir, Eastern bank opp. Jentah, Apr 1976, *B.C. Stone* 12549 (KEP, KLU); Jeram Pasu, May 1982, *B.C. Stone et al. 15211* (KLU); Merapoh, near base camp, Jun 1995, *Ong* 654 (KLU); Merapoh, bird trail forest near base camp, Jun 1995, *Ong* 572 (KLU). **Terengganu:** Rantau Panjang F.R., Jun 1921, *H.L. Hume* 7589 (SING); Kemaman, Bukit Kojang, Nov 1935, *E.J.H. Corner s.n.* (SING, K); Kemaman, Ulu Bendong, Nov 1935, *E.J.H. Corner s.n.* (SING); Ulu Brang, Jul 1937, *L.M.J. Moysey & Kiah SF* 33726 (SING); Dungun, Jambu Bongkok F.R., Aug 1964, *Kassim M. s.n.* (KLU); Dungun, May 1968, *Soepadmo KLU* 9151 (KLU); Bukit Yong, Jerteh, Mar 1975, *Md.Shah et al. 3542* (KEP, KLU, SING); Dungun, Bukit Bauk Forest Reserve, Feb 1998, *Tham S.M.* 56 (KEP); Besut, Bukit Bintang, Hilltop around Telekom station, Sep 2006, *Yao T.L. et al. FRI 53122* (KEP, L). **Perak:** Telok Sera, Mar 1896, *H.N. Ridley s.n.* (SING); Bukit Kapayang, 1904, *H.N. Ridley s.n.* (SING); Ulu Temango, Jul 1904, *H.N. Ridley* 14376 (BM, SING); Taiping Hill, Jan 1923, *M.R. Henderson* 10413 (SING); Taiping Hill, Feb 1923, *M.R. Henderson SF* 10451 (SING); Kuala Kangsar, Bubu Forest Reserve, Apr 1933, *C.F. Symington* 29943 (KEP); Batu Kurau, Apr 1968, *Sidek bin Kiah S* 331 (SING); Maxwell Hill, Nov 1980, *Keng Wee et al.* 58 (SINU); Kuala Kangsar, Kledang Saiong Forest, 1987, *S. Anthony* 769 (KEP). **Pahang:** Pulau Tijau, Pahang River, 1891, *H.N. Ridley* 2381 (SING); Tahan River, 1891, *H.N. Ridley* 2382 (SING); Titi Bangor, Temerloh, Mar 1923, *M.R. Henderson SF* 10631 (SING); Fraser's Hill, Aug 1923, *Md.Nur SF* 11039 (SING); Pulau Tioman, Gunong Rokam, May 1927, *Md.Nur SF* 18773 (SING); base Gunong Senyum, Aug 1929, *M.R. Henderson SF* 22335 (SING); Raub, Bilut FR, Apr 1932, *Osman* 28480 (KEP); Bentung, Lentang FR, Jun 1935, *Symington* 40519 (KEP); Raub, Bukit Kajang, Jun 1935, *C.F. Symington* 40535 (KEP); Fraser's Hill, Ring Road, Apr 1955, *J.W. Purseglove* 4173 (K, L, SING); Jengka For. Res., Nov 1963, *E.A. Turnan* 909 (KLU); Pekan, Bukit Chini FR, Oct 1968, *P.S. Bray FRI* 11652 (KEP); Ulu Sungai Sepia, near Kuala Aur, Jul 1970, *Md.Shah & Md.Noor* 1905 (KEP, L, SING); Aug 1970, *Rao et al. s.n.* (SING); Ginting Highlands Road, May 1972, *B.C. Stone* 10761 (KLU); Taman Negara, Kuala Trenggan, path to salt lick, Aug 1972, *B.C. Stone* 10839 (KLU); Fraser's Hill, path to the Lodge, Aug 1972, *Md.Shah* 2731 (SING); Kuala Tahan, Taman Negara, 1973, *B.C. Stone* 11545 (KLU); Fraser's Hill, Nov 1973, *Keng et al.* 34 (SINU); nr basecamp at Ulu Sungei Kinchin, Rompin-Endau, Aug 1996, *I.M. Turner* 96-103 (SING); Temerluh, Krau Game Reserve, Oct 1999, *Chua L.S.L. FRI* 40873 (KEP); Nenasi FR, Nov 2005, *Shamsul Khamis et al. N-42* (KEP); Temerloh, Bukit Rengit, Krau wr, Rentis Tualang, Mar 2006, *K. Imin et al. FRI* 50603 (KEP); Rompin, P.Tioman, Kpg.Paya, Mar 2007, *K. Imin et al. FRI* 50949 (KEP, L). **Selangor:** KL, Univ. Malaya Bot. Garden Greenhouse, *Khatijah* 103 (KLU); Bukit Kuda, Jun 1889, *H.N. Ridley s.n.* (SING); Kwala Lumpor, Feb 189x, *C. Curtis s.n.* (SING); Batu Tiga, Feb 1904, *H.N. Ridley* 11878 (SING); Klang Gates, Aug 1908, *H.N. Ridley s.n.* (SING); Ulu Langat, Feb 1912, *C.B. Kloss s.n.* (BM); Kwala Lumpur, Welds Hill, Mar 1915, *H.N. Ridley s.n.* (BM, K, SING); Selangor, Ulu Gombak, Sep 1921, *H.L. Hume* 8625 (SING); Selangor, Ulu Gombak, Oct 1921, *H.L. Hume* 9152 (SING); Ginting Simpah, Oct 1921, *H.L. Hume* 9328 (SING); Petaling, Sungai Buloh, Feb 1928, *E.J. Strugnell* 13939 (KEP); Hulu Langat, Sungai Lalang Forest Reserve, Mar 1930, *C.F. Symington* 22671 (KEP); Ginting Simpah, Oct 1937, *Md.Nur SF* 34263 (K, SING); Gombak, Ulu Gombak, Apr 1958, *Abdullah b.I. & A.H. Willard*

304 (KEP, S INU); Ulu Gombak. Jun 1962, *B.L. Burtt & P.J.B. Woods* 1632 (E); Genting Simpah rd. 22nd mile, Ulu Gombak FR, May 1965, *B.C. Stone* 5751 (KLU); Ulu Gombak 16th mile, UM Field Studies Centre, Nov 1965, *Soh Kim-Gai* 111 (KLU); Templer Park forest reserve, Jun 1971, *Teo L.E.* 406 (L, SING); Ulu Lanlat. Sungei Serai water shed, Mar 1976, *Lee D.W.* 23338 (KLU); Petaling, Air Hitam Forest Reserve, Sep 1978, *S. Anthony* 208 (KEP); Klang Gates Ridge, Jan 1982, *R. Kiew* 1180 (SING); Teluk Selangor, Dec 1990, *Khairuddin Hj. Itam* 7 (KEP); Jln Gombak km48/47(Bentong). FRIM-examination plot, Jun 2005, *H. Duistermaat* 348 (L, SING); N. of Kuala Lumpur, Jln Gombak km 36/37(KL), Jun 2005, *H. Duistermaat* 355 (L, SING); Gombak, Ulu Gombak FR, Miles 15, Mar 2006, *K. Imin et al.* *FRI* 50567 (KEP). **Negeri Sembilan:** Gunong Bumbon, Jun 1885, *Y.H. Alvins* 2020 (SING); Gunong Tampin, Nov 1922, *R.E. Holtum* *SF* 9536 (K, SING); Gunong Angsi, N.W.side, Nov 1923, *Md.Nur* *SF* 11587 (SING); Gunong Telepak Burok, Seremban, Mar 1977, *J.F. Maxwell* 77-155 (L, SINU); Pasoh FR, Aug 1987, *J.V. LaFrankie* 2457 (KEP); Pasoh FR, Sep 1987, *J.V. LaFrankie* 2483 (KEP); Pasoh FR, 1989, *J.V. LaFrankie* 4253 (KEP); Gunung Angsi, Jun 2005, *H. Duistermaat* 343 (SING) & 344 (L, SING); Seremban, Berembun FR, Air Pantai, Sg Batang Benar, Apr 2008, *M.A. Mohd Hairul et al.* *FRI* 60040 (KEP); Jeleeu, Berembun FR, G. Telapak Buruk, Apr 2008, *K. Imin et al.* *FRI* 63020 (KEP); Jeleeu, Berumbun FR, Jeram Toi, forest trail to ridge, Apr 2008, *Yao T.L. et al.* *FRI* 65283 (KEP). **Malacca:** Sungai Buloh, Oct 1899, *H.N. Ridley* 10512 (SING). **Johor:** Tanjong Bunga, 1894, *H.N. Ridley* 6320 (BM, SING); between K.Tinggi and Rombon, K.T., Sep 1929, *Z. Teruya* 1027 (SING); S.Rhu Reba, Jason Bay, Jun 1934, *E.J.H. Corner* *s.n.* (SING, K); Lengor F.R. Mersing, Jul 1957, *Whimore* 406 (SING); Kuala Sedili, New Road, Jun 1959, *Kadim Md.Noor* 163 (SING); Lombong Batu, Mersing, Sep 1966, *Jumali & E.H. Heaslett* *s.n.* (SINU); Kluang, path to Gunung Blumut, Sep 1970, *Md.Shah & Samusi* 2123 (SING); Gunung Panti top westside, Oct 1972, *Samsuri Ahmad Shukor* 784 (SING); Mt.Ophir, Apr 1972, *R.B. Phillips* 1637 (KLU); Endau State Park, Pantai Burung, Apr 1998, *Damahuri S. & Mustapa D. s.n.* (KEP); Gunung Panti, top, May 2005, *H. Duistermaat* 336 (L, SING); Segamat, Ulu Sg.Segamat, trail up the ridges, Aug 2007, *Chew M.Y. & Kueh H.L.* *FRI* 55597 (L); Kota Tinggi, Panti FR, G.Panti, Jul 2008, *Yao T.L. et al.* *FRI* 65379 (KEP).

SINGAPORE. MacRitchie Res, *Sinclair* 4931 (E); Tampines, 189x, *J.S. Goodenough* *s.n.* (SING); Reservoir Woods, 1893, *H.N. Ridley* *s.n.* (SING); Pulau Ubin, 1893, *H.N. Ridley* 4810 (SING); Chan Chu Kang, 1894, *H.N. Ridley* *s.n.* (SING); Reservoir woods, 1906, *H.N. Ridley* *s.n.* (SING); Bukit Timah Forest Reserve, Sep 1959, *Md.Shah* 747 (SING); Bukit Timah Nature Reserve, Sep 1965, *Hesslett* 3468 (SINU); Bukit Timah Nature Reserve, May 1967, *Jumali* *s.n.* (SINU); SW of MacRitchie Reservoir, May 1993, *W.S. Chee et al.* 2158 (KEP); Bukit Timah, Fern Valley, Jun 1998, *L.M.J. Chen* 245 (SING) & 246 (SING); Bukit Timah Nature Reserve, 2000, *C.F. Teo D.H.L.* 25 (SINU); Nee Soon, Jun 2003, *Samsuri et al.* 27 (SING); Bukit Timah Nature Reserve, Tiup Tiup path, Mar 2004, *Samsuri et al.* 41 (SING); SBG, rainforest off Liana Rd close to Cluny Rd, Apr 2005, *H. Duistermaat* 328 (L, SING); Bukit Timah, Fern Valley, Apr 2005, *H. Duistermaat* 331 (L, SING) & 333 (SING); Bukit Timah NR, Rangas Path, May 2005, *H. Duistermaat* 340 (SING); MacRitchie Reservoir, patch behind Gardenia Rd, May 2005, *Gwee A.T. et al.* 2005-142 (SING).

SUMATERA. **Aceh:** Jul 1939, *A.H. Batten Pool* *s.n.* (SING); W.van Kroeng Loeas, O van Troemon, Aug 1941, *Asdat* 41 (L); Bukit Lawang-Bohorok-Langkat, Feb 1973, *R. Soedarsono* 262 (L, SING) & 307 (L); Gng Leuser NP, G.Mamas, Feb 1975, *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyffes* 14789 (L); Gng Leuser NP, Alas river valley, Jul 1979, *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyffes* 18480(vel 1) (L); Gng Leuser NR, Sikundur FR, Aug 1979, *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyffes* 19293 (L); Kloet NR, along Krung (=river) Lembang, Jul

1985, *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyffes 19740* (L); Kloet NR, along Krung (=river) Lembang, Jul 1985, *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyffes 19904* (L). **Sumatera Barat:** Afd.4 Kota S.Koeriman, May 1918, *H.A.B. Buennemeyer 3312* (SING, L); Afd. Agam Brani, May 1918, *H.A.B. Buennemeyer 3355* (L). **Kepulauan Riau:** Anambas / Natuna Islands, Terempak, Siantan, Apr 1928, *M.R. Henderson SF 20254* (SING); Siantan Isl., E of Terompa, Apr 1928, *C.G.G.J. van Steenis 918* (L, SING, U). **Jambi:** S Kejasung Tabin, Jambi Sunake, Mar 1980, *Y. Laumonier 804* (L); P.T. IFA Concession, Pasir Mayang, Feb 1982, *M.J. Vreeken-Buijs. 45* (L). **Sumatera Selatan:** Palembang, Rawas, Jun 1917, *J.M. Dumas 1598* (L). **BORNEO. Sarawak:** Kuching: Lundu, Jalan Lundu, *Othman et al. S 61977* (E); Kuching, Lundu, Sentunggan, Dec 1995, *Lai S.T et al. S 54495* (cf; KEP, L).

6. *Amischotolype griffithii* (C.B.Clarke) I.M.Turner (Fig. 9C)

Amischotolype griffithii (C.B.Clarke) I.M.Turner, Novon 6 (1996) 221; Coode et al., Checklist Fl. Pl. Gymn. Brun. Dar. (1996) 352 (see note 2); Turner, Gard. Bull. Sing. 47 (1997) 515. — *Forrestia griffithii* C.B.Clarke in A.DC. & C.DC., Monogr. Phan. 3 (1881) 236; Hooker f., Fl. Brit. India 6 (1894) 383; Ridley, Mat. Fl. Malay. Penins. 2 (1907) 123; Fl. Malay. Penins. 4 (1924) 360; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169; *non* Cowley & Furness, Kew Bull. 52 (1997) 469; *non* Beaman & Beaman, The Plants of Mount Kinabalu 3 (1998) 109 (= see note 2). LECTOTYPE (designated by Turner (1996)): *Maingay 1712, p.p.* (K), Peninsular Malaysia, Malacca.

Stem ascending from rhizome; erect part c. 100 cm long, simple; internodes glabrous. **Sheath** 7–13 mm diam., glabrous, mouth (sparsely) ciliate. **Leaf blade** (18–)25–35 × 4.5–7.5 cm, 3.3–5.6 times as long as wide, base gradually to rather abruptly narrowed into a winged pseudopetiole 1–3 cm long and c. 2 mm wide; lower surface sparsely to densely (0.5–)1–2 mm long hairy, upper surface sparsely to moderately 1–2 mm long yellow-hairy; submarginal hairs on upper surface, (0.8–)1–3 mm long, (rather) dense, yellow to reddish gold or rarely red. **Inflorescence** on erect stem, sessile, 2–3.5 cm diam., (rather) dense with branches obscure, 10–20-flowered. **Pedicel** 1–1.5 mm long. **Sepals** 4.5–6.5(–7.5) × 2.5 mm, not elongating in fruit, (white or) red to purplish, sparsely to moderately (rarely densely) 0.5 mm long ciliate margins and keel or hairy all over, tip hooded. **Petals** 4–4.5 × 1.5 mm, slightly shorter than sepals, white, glabrous, margin entire. **Stamens** with filaments c. 8 mm long, colour unknown, upper half with 1.5 mm long hairs; anthers 1.1 × 0.7 mm, yellow, thecae opening by an apical pore. **Capsule** (7–)8–12 × 5–8.5 mm, pyriform, longer than sepals by (1.5–)3.5–6 mm, white to purple, upper half only to entirely sparsely to moderately (0.7–)1(–2) mm long hairy; valves free; apex depressed, lobes absent; style remnant 0.5–0.7 × 0.2–0.3 mm, deciduous. **Seeds** 2 per locule, aril colour unknown.

Distribution. Peninsular Malaysia (Penang, Kelantan, Perak, Pahang, Negeri Sembilan, Malacca, Johor), Sumatera (Riau).

Ecology. Moist to wet or swampy primary or regenerating (dipterocarp) forest, by streams or riversides; shaded or rarely unshaded. Altitude: 60–1310 m asl.

Notes. 1. *Maingay 1712* is a mixture (see Clarke, 1881), with one specimen (L) which is *A. barbarossa*, and another (K; only seen from a photo) which is the present species. Two specimens at SING [*Holmberg 856* and *Ridley s.n.* (Perhantian Tinggi)] identified by Ridley as *F. griffithii* are in accordance with the above description.

2. According to Ridley (1907) this species is endemic to Peninsular Malaysia. Today it is also known from Sumatera where it has been found only twice. It has been mentioned for Borneo (Coode et al. 1996, Beaman & Beaman 1998), but specimens available for study are all *A. hirsuta* Hallier f., a closely similar species with hairy internodes and hairy sheaths (J. & M.S. Clemens 26039, 26476; Cowley 19), and *A. lobata* (Shea & Aban SAN 76938), a species with distinctly lobed capsules.

Specimens examined: PENINSULAR MALAYSIA. **Penang:** 189x, *H.N. Ridley s.n.* (SING). **Kelantan:** Sungei Merkeh, Bukit Baka, Machang, *Md.Shah & Ahmad Shukor 3186* (KEP, KLU, SING); Sungei Sat FR, Bukit Baka, base, May 1982, *B.C. Stone in Chin S.C. 3200* (KLU); Kuala Krai, Gua Bogo, track to G.Stong and camp Ba, Feb 2007, *Yao T.L. et al. FRI 55864* (KEP, L). **Perak:** Kinta, Ulu Sungai Kinta, Jun 1938, *Sow 47255* (KEP). **Pahang:** Tras, May 1903, *A.D. Machado s.n.* (SING); Fraser's Hill, upon the Selangor border, Sep 1922, *H.M. Burkill & R.E. Holttum 8869* (SING); Gunung Lesong FR, May 1939, *Fontian Forester 31645* (KEP); Fraser's Hill, near Selangor Residency, Aug 1959, *Md.Shah & Md.Noor 731* (SING); Fraser's Hill, Aug 1969, *B.C. Stone 8753* (KLU); Temerluh, Krau GR, Kuala Lompat, Sep 1981, *R.W. Kiew 1049* (KEP). **Negeri Sembilan:** Perhantian Tinggi, 18xx, *H.N. Ridley s.n.* (SING); Gunong Tampin, Sep 1913, *H.C. Robinson s.n.* (K); Tebong FR, Dec 1959, *M.E.D. Poore 134* (KLU); Port Dickson, Sungai Menyala Forest, Oct 1978, *R.W. Kiew 675* (KEP); S.Menyala F.R., Oct 1978, *R.W. Kiew 688* (SING). **Malacca:** Ager Punnus (Ayer Panas), *W. Griffith 5485*, p.p. (K); *A.C. Maingay 1712*, p.p. (K); 1891, *D.F.A. Hervey s.n. A* (SING) & *s.n. B* (SING); Selandor, Jan 1885, *Y.H. Alvins 473* (SING); Sep 1885, *Y.H. Alvins 2102* (SING); Bukit Singei, Mar 1886, *Y.H. Alvins s.n.* (SING); base of Mount Ophir, Aug 1888, *R.W. Hullett s.n. (844)* (K); Jasin, Apr 1890, *Anon. 499* (SING); Bukit Sidanan (Sadanan), Aug 1891, *P.J. Holmberg 856* (BM, K, SING). **Johor:** Gunung Pulai, 1892, *Mat. s.n.* (SING); Gunung Pulai, Dec 1904, *H.N. Ridley s.n.* (SING); Bukit Semanau, Aug 1915, *H.M. Burkill SF 1337* (SING); 192x, *Y.H. Alvins 1587* (SING); Endau Rompin, nr Jasin River just S of junction Endau River, Mar 1992, *J.S. Klackenberg & R. Lundin 587* (L).
SUMATERA. **Riau:** Muara Padjanki, Apr 1939, *P. Buwalda 6485* (L); Tigapulu Mts, Bukit Karampal area, Nov 1988, *J.S. Burley et al. 1237* (L, SING).

7. *Amischotolype hirsuta* (Hallier f.) Duist. **comb. nov.** (Fig. 9D & 13A)

Forrestia hirsuta Hallier f., Beih. Bot. Centralbl. 34 (1916) 47; Merrill, J. Straits Branch Roy. Asiat. Soc. (1921) 113; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169. TYPE: *Winkler 2617*, 28 Jun 1908, SE Borneo, Hayup (holo B, photo (Barcode: B 10 0296342 / Image Id: 302935); iso L).

Amischotolype griffithii auct., sensu Coode et al., Checklist Fl. Pl. Gymn. Brun. Dar. (1996) 352; Beaman & Beaman, Plants Mount Kinabalu 3 (1998) 109; non C.B. Clarke (= *A. griffithii*).

Amischotolype mollissima auct., sensu Cowley & Furness, Kew Bull. 52 (1997) 469; Beaman & Beaman, Plants Mount Kinabalu 3 (1998) 110; non Blume (= *A. mollissima*).

Forrestia mollis auct., sensu C.B. Clarke in A. Candolle & C. Candolle, Monogr. Phan. 3 (1881) 236, p.p. [Beccari 827]. non Hasskarl, Flora 47 (1864) 628, non *superfl.* (= *A. mollissima* (Blume) Hassk.); non Ridley, Mat. Fl. Malay. Penins. 2 (1907) 124; J. Malayan Branch Roy. Asiat. Soc. 1 (1923) 103; Fl. Malay. Penins. 4 (1924) 360 (= *A. barbarossa* Duist. sp. nov.).

Stem ascending from short rhizome; erect part 50–200 cm long, sometimes scrambling, simple; internodes sparsely to densely (0.3–)1–2.5 mm long hairy or rarely glabrous. **Sheath** (8–)10–15(–22) mm diam., with at least several frontal lines of hairs and a single line of hairs at its back, hairs 2–4(–7) mm long, yellow, mouth ciliate and sometimes glabrescent. **Leaf blade** 20–35(–42) × (4–)5–7(–11) cm, 3.5–6.0(–7.4) times as long as wide, lower surface red tinged or not, base (very) gradually to rather abruptly narrowed into a winged pseudopetiole up to 3 cm long and c. 3 mm wide; lower surface sparsely to densely (0.5–)1–4 mm long white- to yellow-hairy, upper surface sparsely (mostly near midvein) to rather densely (1.5–)2–4 mm long yellow-hairy; submarginal hairs on upper surface, 1.5–2.5 mm long, (rather) dense, yellow or rarely orange. **Inflorescence** on erect stem or rarely at knee, sessile, 1.8–4.5 cm diam., dense with branches obscure, 15–40-flowered. **Pedicel** 1.5–3 mm long. **Sepals** (4.5–)6–10 × 2–4(–5) mm, not elongating in fruit, green (in flower) to lilac or purple (in fruit), glabrous to margins and keels 0.5–1 mm long ciliate, tip hooded. **Petals** c. 8 × 2.5 mm, as long as sepals, pale pink, glabrous, margin minutely fringed. **Stamens** filament c. 8 mm long, colour unknown, upper 1 mm with (0.5–)2 mm long hairs; anthers 1–1.3 × 0.8–1 mm, colour unknown, thecae opening by a longitudinal slit. **Capsule** 6–9 × 3.5–6 mm, ovoid to pyriform, equalling or exceeding sepals by up to 4 mm, (pale) green or pinkish to reddish- or deep purple, narrowed part of apex to upper 1/3 1–2 mm long, yellow bristle-hairy; valves (almost) free; apex depressed, lobes absent; style remnant c. 0.5 × 0.4 mm, finally deciduous or rarely persistent. **Seeds** 2 per locule, aril orange.

Distribution. Sumatra (Padang), Borneo (Brunei; Sabah: West Coast, Interior, Sandakan, Tawau; Sarawak: Kuching, Samarahan, Sri Aman, Sibul, Bintulu, Miri; Kalimantan: Dusun, Central, West, East, SE).

Ecology. Primary, disturbed, logged-over or secondary, lowland, mixed dipterocarp, swamp, alluvial, beach or montane forest, on flat land, river bank, hill side or ridge, on damp, rich dark or yellow sandy soil, shale or sandstone. Altitude: 6–1400 m asl.

Notes. 1. Hallier (1916) described *Forrestia hirsuta* as being very close to Ridley's *F. irritans* but with hairy sheaths and with smaller and almost glabrous inflorescences. However, it shows more resemblance to *A. griffithii* with which it has been confused (see there, note 2), and which is almost confined to Peninsular Malaysia.

2. This species is almost restricted to Borneo, with only two specimens known from Sumatera (*Beccari* 827, Padang, near Ajer mantjur; *Korthals s.n., s.loc.*).

Specimens examined: SUMATERA. *P.W. Korthals s.n.A* (L). **Sumatera Barat:** Padang, Abita, nr Ajer mantjur, Aug 1878. *O. Beccari* 827 (K, L).

BORNEO. **Brunei:** Belait: Labi, Rampayoh. *J. Cowley* 157 (K); Belait, Labi, Rampayoh, Jul 1993, *Cowley et al.* 19 (L); Belait: Labi, Mendaram, Wasai Wong Kadir, Jun 1995, *Ariffin Kalat BRUN* 16792 (K). **Sabah:** West Coast: Kota Belud, Mt. Kinabalu, Dallas, Sep 1931, *J. & M.S. Clemens* 26476-26039 (BM, L); Mount Kinabalu, Penibukan, near camp, Mar 1933, *J. & M.S. Clemens* 35012 (BM); Ranau, about 8 miles E of Kampung Merungin, Nov 1975, *Leopold & Saikeh SAN* 82649 (SAN); Ranau, Kampong Nalumad, Aug 1996, *A. Daim* 566 (KEP); Interior: Tambunan, Mnt Trusmadi, Mar 1969, *H.P. Nooteboom* 1444 (L); Tambunan distr: Crocker Range, Oct 1983, *J.H. Beaman et al.* 7272 (K, L); Sipitang, Lumaku FR, L39, Mondolong SFI Concession, Aug 1988, *Muhammad Saedi et al.* 64 (SAN); Tambunan, Trusmadi, Loloposon (Gua), Jul 2005, *J.J. Vermeulen in H. Duistermaat* 398 (L, SING). Sandakan: Dagat Camp, Apr 1963, *Wing J. Ah SAN* 35497 (K, SAN); mile 32 Labok Rd, agric.stat, Mar 1970, *H.P. Nooteboom* 1605 (L); Ulu Dusun, oil palm Res. Sta., Mar 1977, *B.C. Stone* 12875 (KLU); Kinabatangan, Kampong Ulu Menanam, Sep 1978, *S. Dewol & T. Kodoh SAN* 89259 (KEP); Beluran, Ulu Sg. Muanad, Nov 1984, *Irang Ak. Angi SAN* 67433 (L, SAN); Beluran, Jan 1985, *Amin et al. SAN* 69486 (KEP, L, SING); Kinabatangan, Tongod, Pinangah FR, Feb 1985, *S. Dewol & Mansus SAN* 67483 (SAN); Kinabatangan, Ulu Sungai Melikop, Jun 1985, *S. Dewol & T. Langkap SAN* 109288 (KEP, L); Lahad Datu, Ulu Segama, Danum Valley, at entrance to west trail, Mar 1987, *G. Argent et al. GA* 681987 (E, SAN); Sepilok FR, Jan 1989, *P. Kessler SAN* 118180 (SAN); Lahad Datu, Base Gunung Nicola, Feb 1992, *A. Berhaman SAN* 134457 (SAN); Kinabatangan, Lake Linumunsut, Oct 2001, *Sidkan A. MB* 1063 (SAN); Lahad Datu, Danum Valley, May 2004, *T.M.A. Uteridge et al.* 486 (KEP); R.I.C. Sepilok, Sep 2004, *S. Dewol et al. SAN* 142184 (SAN); Tawau: Elphinstone Province, 1922-23, *A.D.E. Elmer* 20507 (BM, L, SING, U); Apas, May 1948, *Kadir A* 2084 (KEP, SING); Kalabakan, Ulu Sungai Kalabakan, May 1984, *Fedilis & Matin SAN* 103611 (L, SAN). **Sarawak:** Kuching: Meatang, Aug 1884, *R.W. Hullett s.n.* (SING); Setapok, Kuching, Sep 1955, *J.W. Purseglove & Md. Shah P* 4394 (L, SING); Lundu, Sematan Beach, Sep 1987, *Abg. Mohtar et al. S* 54298 (K, L); Bau, Bukit Kho Ze San, Bau subdistrict, Dec 1994, *Rantai Jawa et al. S* 70126 (cf: KEP); Bau, Gg. Lanyang, Apr 2002, *S. Julia et al. SBC* 2908 (SING); Samarahan: Gng Buri, Ulu Simunjan, Sep 1975, *P. Chai S* 36723 (L); Serian, Bukit Rawang, Tebakang area, Apr 1983, *Dyg. Awa & I. Paie S* 45586A (L); Sri Aman: Abok, Apr 1990, *G. Rena et al. S* 58955 (K, KEP, L); Sibui: Kanowit, Sana, Sungei Tau, May 1956, *J.W. Purseglove* 5120 (L, SING); Bintulu: Oct 1985, *I. Paie S* 50161 (K, KEP, L); Miri: Marudi, Gng Mulu NP, Jul 1977, *B. Lee S* 38062 (L); Marudi, G. Mulu NP, Apr 1978, *R. Kiew RK* 283 (KEP); Marudi, 4th Div, Route to Bt Lawi, Bario, Aug 1985, *Dyg. Awa & L. Bernard S* 50535 (K, L); Marudi, Sungei Tutoh, Bt Pelamau, Apr 1997, *R.M.A.P. Haegens et al.* 408 (K, L). **Kalimantan C:** Dusun-area, *P.W. Korthals s.n.* (L); Kuala Kuayan 112 28E 2 00S, Mar 1984, *C. Hansen* 1323 (L). **Kalimantan W:** Liang Gagang, *H. Hallier B* 2956 (L); Pontianak, Sep 1948, *Moh. Enoch* 355 (L); Gn Palung NP, Oct 1996, *T.G. Laman et al.* 51 (K, L). **Kalimantan E:** Nunukan, N. of Tarakan, Nov 1953, *W. Meijer* 1978 (L); Kebun raya univ. Mulawarman Samari, Aug 1974, *H. Wiradinata* 298 (L); Jelini, along

Sungai Belayan, NW of Tabang, Jan 1979, *G. Murata et al.* B 1139 (L); Tabang, West Kutai, Dec 1980, *M. Kato & H. Wiriadinata* B 6098 (L); Long Bawan-Panado, Jul 1981, *R. Geesink* 9061 (L); P.T.ITCI, Kenangan-G.Meratus km 69, Mar 1995, *P. Kessler et al.* 944 (K, L); PT KEM ENVIR. Lingau plateau, Jun 1996, *Arbainsyah AA* 1870 (L); Berau Forest, Swakelola, Labanan, Oct 1996, *P. Kessler et al.* Berau 145 (K, L); PT Kelian, Mar 1997, *P. Kessler* 2091 (L); Wartono Kadri, Mar 2005, *C. Bernard et al.* 7362 (L). **Kalimantan SE:** Hayup, Jun 1908, *H. Winkler* 2617 (L).

8. *Amischotolype hispida* (A.Rich.) D.Y.Hong (Fig. 9E & 13B)

Amischotolype hispida D.Y.Hong, Acta Pytotax. Sin. 12, 4 (1974) 461, *pro nomen*. — *Forrestia hispida* A.Rich. in Dumont d'Urville, Voy. Astrolabe 2 (1834) 2; Miquel, Fl. Ned. Ind. 3 (1855) 547; Hasskarl, Flora 47 (1864) 629; Commelin. Ind. (1870) 86; C.B.Clarke in A.Candolle & C.Candolle, Monogr. Phan. 3 (1881) 236, *p.p.* (See note 2); Lauterbach, Bot. Jahrb. 50 (1913) 64; Merrill, J. Straits Branch Roy. Asiat. Soc. (1921) 113, *p.p.* (see note 3); Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169. — *Forrestia hispida* A.Rich. var. *typica* Hallier f., Nova Guinea 8 (1913) 906; Beih. Bot. Centralbl. 34 (1916) 46, *p.p.* (See note 3). — *Forrestia mollissima* (Blume) Koord. forma *hispida* (A.Rich.) Backer, Handb. Fl. Java I, 3 (1924) 33. TYPE: *Lesson s.n.*, August 1827, *crescit in sylvis Novae-Guineae* (holo P, in herb. Franquaville, *u.v.*; klepto L in hb Hasskarl).

Forrestia nigricans A.Rich. ex Steud., Nomencl. Bot. ed. 2 (1840) 644. TYPE: not indicated (see note 5).

Forrestia philippineusis Merr., Publ. Bur. Sci. Gov. Lab. 35 (1906) 5; Philipp. J. Sci. 2, 4 (1907) 266; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169. — *Forrestia hispida* A.Rich. var. *glabrior* Hallier f., Nova Guinea 8 (1913) 906; Beih. Bot. Centralbl. 34 (1916) 46. — *Forrestia hispida* A. Rich. var. *philippineusis* (Merr.) Merr., Enum. Philipp. Fl. Pl. 1 (1925) 197. TYPE: *Merrill 4051* (holo PNH, *u.v.*; iso K, photo).

Forrestia hispida A.Rich. forma *glabrescens* Lauterb., Bot. Jahrb. 50 (1913) 64; Hallier f., Nova Guinea 8 (1913) 906 (*forma dub.*). SYNTYPES: *Moszkowski 205*, 11 July 1910, Tana, Flussufer, c. 90 m alt. (B, *u.v.*; L?, *u.v.*); *Moszkowski 302*, October 1910, Naumoni (B, *u.v.*; L?, *u.v.*).

Forrestia hispida A.Rich. var. *calva* Hallier f., Nova Guinea 8 (1913) 906; Beih. Bot. Centralbl. 34 (1916) 46. SYNTYPES: *Atasrip 32* (L), *Gjellerup 4* (L).

Stem ascending from long rhizome; erect part 45–250 cm long, often trailing or scrambling, lower part occasionally with many stilt roots, simple; internodes glabrous to densely 0.1–0.3 mm long hairy. **Sheath** (9–)11–20(–24) mm diam., with several frontal lines of 2–4 mm long, colourless to straw-coloured hairs, rarely glabrous or

0.1–0.2 mm long hairy, mouth ciliate or rarely glabrous. **Leaf blade** (19–)28–48 × (4.1–)5.2–10.3 cm. (3.2–)4–6.5(–7.3) times as long as wide, lower surface purplish tinged or not, base very gradually to rather abruptly narrowed into an indistinct winged pseudopetiole to 8 cm long and 2 mm wide; lower surface glabrous to densely 0.1–0.5(–1) mm long white-hairy, upper surface glabrous to densely 0.2–0.7 mm long white-hairy and/or with 1.5–3.5 mm long yellow hairs; submarginal hairs on upper surface. (0.5–)1–2 mm long, dense, yellow. **Inflorescence** on erect stem, sessile, 3–6 cm diam., dense with branches obscure, (10–)20–many-flowered. **Pedicel** 2–6 mm long. **Sepals** 10.5–16(–18) × 2–5 mm, unknown elongating in fruit, pink to pale purple in flower, violet or reddish blue to brilliant (dark) red-purple in fruit, glabrous to moderately 0.2–0.5(–1) mm long ciliate margins and keel or rarely sides moderately 0.5 mm long appressed red-hairy, tip hooded. **Petals** 9–11.5 × 2 mm, shorter than sepals, white or with purple base or flushed with purple, glabrous, margin at apex minutely fringed. **Stamens** with filaments 10–12 mm long, colour unknown, upper part up to 1 mm below apex with 1–2 mm long hairs; anthers 1.2–2 × 0.5–1 mm, white to yellow, thecae opening by a longitudinal slit. **Capsule** 5–8 × 3.5–6.5 mm, ovoid, shorter than sepals by 4–9 mm, (pale) purple or red, glabrous or apex to upper half moderately 0.1–0.5(–1) mm long soft-hairy; valves fused for 1/4 to 1/2 of length; apex slightly depressed, lobes absent; style remnant 0.5–0.7 × 0.2–0.4 mm, finally deciduous. **Seeds** 2 per locule, aril orange.

Distribution. Philippines (Luzon, Polillo, Catanduanes, Mindoro, Negros, Samar, Leyte, Mindanao), Borneo (Kalimantan: W, E, SE), Sulawesi (North, Central), Maluku (Sula, Ceram, Buru, Ambon, Kai), New Guinea (Irian Jaya: Cendrawasih, Yapen Island, NE, Central, Bomberai, S; Papua: Sepik, Madang, Morobe, Central, Gulf).

Ecology. Primary or secondary (mixed dipterocarp or *Terminalia*) rain forest, on ridges, (steep) slopes, in periodically inundated or riverine areas, gullies or (sagopalm-) swamps, also in old *Araucaria* and cacao plantations; partially shaded; on clay, alluvial or volcanic soil or limestone. Altitude: 0–1000(–1500) m asl.

Notes. 1. This species was the first described in the genus *Forrestia*. Hong (1974) legally transferred it to *Amischotolype*, but the taxonomic use of the name has been different (see note 2).

2. *Amischotolype hispida* has an East-Malesian distribution, reaching as far north and west as the Philippines and Borneo. It is absent from continental Asia and it is the only species of the genus present in New Guinea. It has been mentioned for Taiwan (Clarke 1881: Formosa; Wang et al. 2000, Yang et al. 2001) and China (Hong 1974, 1997; McKean 1988), but characters in the descriptions and all material studied for these areas (*Cavalerie*, Jul. 2565, 3517; *Henry* 10884, 12204, 13377; *Kawagoe* s.n., 8-1914; *Kuoh*, C.-S. 3882A; *Lau* 427, 5422; *Liang* 62393; *Liu* et al. 21; *Teng*, S.W. 90984) are referable to *A. glabrata*.

3. Hallier (1916) and Merrill (1921) included material of *A. pedicellata* in this species (*Hallier* B2600). For differences see note under that species.

4. This species is fairly variable with respect to indument of vegetative parts, sepals and capsule. Hallier (1913) described three varieties, based on the amount of indument on the sheath, occurring on New Guinea, Borneo and the Philippines. I see no use in maintaining these entities. Likewise, in Sulawesi and Maluku the internodes are always glabrous, but otherwise not different and therefore material from these places are included in the present species.

5. Steudel (1840) claims that [A.]Rich. described *F. nigricans*. However, I have not been able to find a publication with this name. It is most likely an 'in sched.' name. As it was mentioned for 'N. Guinea' it must refer to *A. hispida*, the only species of this genus on New Guinea.

6. I have seen only a photo of the type specimen, and none of the other specimens that Merrill (1906) cited of *F. philippinensis*, which he described with filaments glabrous. A specimen in SING (Baker 3357) identified by Merrill as *F. philippinensis* is possibly *A. hispida*. Unfortunately, this specimen is a fruiting one and has lost all of its stamens. However, the original description of Merrill's *F. philippinensis* is otherwise very similar to *A. hispida* and it is therefore treated as a synonym of the latter.

Specimens examined: PHILIPPINES. **Luzon**: Atimonan, Tayabas, Mar 1905, *E.D. Merrill* 4007 (E); Tayabas, Lucban, May 1906, *A.D.E. Elmer* 7410 (E, L); Laguna Province, Mt. Maquiling, Nov 1912, *V. Servinas* BS 16877 (L); Mt. Mabilang, May 1914, *C.F. Baker* 3357 (SING); Sorsogon province, Irosin (Mt. Bulusan), Aug 1916, *A.D.E. Elmer* 14101 (L, U); Laguna Province, Los Banos, Mt. Maquiling, 1917, *A.D.E. Elmer* 17973 (L, U); Laguna, Mt. Maquiling, Dec 1935, *C.F. Symington* 40928 (KEP); Sorsogon Prov., Mt. Bulusan, 1947, *M.D. Sulit* PNH 2791 (cf; SING); Albay Province, Mayon Volcano, Jun 1953, *D.R. Mendoza* PNH 18305 (L); Sorsogon Province, Mt. Juban, Jun 1956, *G.E. Edano* PNH 37124 (L); Irosin, Sorsogon Province, Mt. Bangko, May 1957, *G.E. Edano & H. Gutierrez* PNH 37820 (L); Albay, Mt. Malinao, Brgy. Tagoytoy, So. Sadurong, Oct 1995, *E.J. Reynoso et al.* PPI 21180 (L). **Polillo**: Aug 1909, *C.B. Robinson* BS 6935 (L); Oct 1909, *R.C. McGregor* BS 10387 (L). **Catanduanes**: 1928, *M. Ramos & G. Edano* BS 75694 (cf; SING); San Miguel, Brgy. Sulung, Mt. Saan, Nov 1991, *Barbon et al.* PPI 2362 (L); So. Boradan, Brgy. Summit, Nov 1996, *E.J. Reynoso & Majaducon* PPI 24872 (L). **Mindoro**: Baco River, Mar 1905, *E.D. Merrill* 4051 (K); Provident tr. Fms. San Teodoro, Feb 1985, *C.E. Ridsdale* 802 (L). **Negros**: May 1908, *A.D.E. Elmer* s.n. (E). **Samar**: Mt. Guinao, Jan 1952, *F.S. Gachalian* PNH 15500 (L); Rawis, Sohoton, National Park, May 1971, *University of San Carlos* 220 (L). **Leyte**: Dagami, Jul 1957, *G.E. Frohne* PNH 35671 (L). **Mindanao**: Davao, Todaya, Mt. Apo, Jul 1909, *A.D.E. Elmer* 11156 (cf; E, L); Agusan Province, Cabadbaran (Mt. Urdaneta), Sep 1912, *A.D.E. Elmer* 13914 (E, L, U); Surigao Province, Mt. Kabatuan, Mar 1949, *D.R. Mendoza & P. Convozar* PNH 10320 (L); Surigao del Sur, Aras-asan (Logging area), May 1975, *University of San Carlos* 793 (L); Dinagat, Agusan del Sur, Sitio Campo Sies, Agusan, Oct 1991, *F.J.M. Gaerlan et al.* PPI 4825 (KEP, L). BORNEO. **Kalimantan W**: Bukit Blitang, *J.E. Teysmann* 8244 (cf; L). **Kalimantan E**: Boengaloen, Nov 1912, *L. Rutten* 736 (U); W. Koetai, no 9, nr M. Antjaloeng, Jul 1925, *F.H. Eudert* 2134 (L); E. Kutei, Sg. Susuk region, Jun 1951, *A. Kostermans* 5553 (L). **Kalimantan SE**: Dusan, Muara Larran, *P.W. Korthals* s.n. (L); Hayup (Hayocp), May 1908, *H. Winkler* 2120 (BM, L). SULAWESI. **North**: Rec. Menado, sub div. Paloe, Aug 1937, *Eyma* 1721 (SING, U); Rec.

Menado, subd. Loewoek, betw Boenta-Gonohop I, Sep 1938, *Eyma* 3736 (L, U); Toraut Dam, Mar 1985, *E.F. de Vogel & J.J. Vermeulen* 6625 (KEP, L); tributary of Sg Ilanga, Feb 1990, *J.S. Burley et al.* 3519 (SING). **Central:** E.peninsula, Pinapoean, Dec 1920, *T.G. Kaudern* 481 (L); Mt Nokilalak area, Apr 1975, *W. Meijer* 9627 (L); rd to Lake Lindu, 60 km SSE of Palu, May 1979, *M. van Balgooy* 3566 (L); E.of Tongoa, Feb 1981, *J.T. Johansson et al.* 37 (L); Batui R., Oct 1989, *M.J.E. Coode* 5941 (L); Lore Lindu NP, Feb 2008, *D. Cicurra* 596 (cf: L).

MALUKU. Sula: Taliaboe, Kp.Likitobi, *Atjeh (Exp.v.Hulstijn)* 354 (L); kampong Mangoli, kali Waj Mana, Sep 1939, *S. Bloembergen* 4672 (L, SING); Taliaboe, Samoeja, Z van kampong, Oct 1939, *S. Bloembergen* 4780 (L). **Ceram:** Proho, Nov 1917, *Kornassi (Exp. Rutten)* 518 (L); weg Kairatoe-Honitetoe, Sep 1918, *L. Rutten* 1617 (L). **Buru:** Waeha, betw Waelanga-Lake Kunturun, Nov 1984, *M. van Balgooy* 4625 (L); Wae Langa, km14, Nov 1984, *H.P. Nooteboom* 5101 (L); Wae Duna river, N of Bara, Nov 1984, *H.P. Nooteboom* 5213 (L); c.10 km S of Bara, Dec 1984, *M. van Balgooy* 5063 (L). **Ambon:** 1792, *Lahaie* 933 (P); Beresih, Nov 1895, *H.G. Botter s.n.* (L); 1913, *C.B. Robinson* 1831 (L). **Kai:** Groot Kei, Goenoeng Daal, Apr 1922, *H.G. Jensen* 114 (L).

NEW GUINEA. P.A. Lesson ex J.K. Hasskarl s.n. (L). **Irian Jaya:** Ayambori bei Dore, *J.E. Teysmann* 6774 (L); Lorentz river nr Alkmaar, Aug 1907, *B. G. Versteeg* 1587 (L); 'Papuarand' am Tal des Noord-Flusses, Oct 1909, *L.S.A.M. von Römer* 397 (L); Moeraira, east coast Geelvink bay, Jun 1912, *R.Fr. Janowski* 1 (L); Beaufort River, Nov 1912, *A. Pülle* 379 (L); near Pionier biv. Forest, Jun 1920, *H.J. Lam* 450 (L) & Jul 1920, 659 (L); near Prauwen biv., Aug 1920, *H.J. Lam* 952 (L); Meervlakte, Batavia biv., Nov 1926, *W.M. Docters van Leeuwen* 11179 (L); Bernhard bivouac, Aug 1938, *E. Meijer Drees* 563 (L); Roode river, Aug 1938, *E. Meijer Drees* 663 (L, SING); Idenburg R, Bernhard Camp, Apr 1939, *L.J. Brass* 13874 (L); Yapen Island, Jappen-Biak, Sg. Soemboi near Seroei, Aug 1939, *Aet & Idjan (exp. L.J.v.Dijk)* 505 (L); Yapen Island, Jappen-Biak, Seroei, Sep 1939, *Aet & Idjan (exp. L.J.v.Dijk)* 824 (L); Sg Si-era (djera) nr Oeta, Jun 1941, *Aet (exp. Lundquist)* 261 (L); Vogelkop, Warsui, nr Ransiki (S of Manokwari), Jul 1948, *A. Kostermans* 2734 (L); Sorong, nr Klamono, Aug 1948, *D.R. Pleyte* 592 (L); N Bird Head Peninsula, steenkool-Temboeni, Apr 1954, *P. van Royen* 4036 (L); Hollandia, Nemo, Mar 1956, *C.F. Kalkman BW* 3471 (L); Manokwari, Rendani, Oct 1959, *V.W. Moll BW* 9549 (L); Manokwari, Feb 1961, *C. Versteegh BW* 10450 (L); Hollandia, Cycloop mountains, Baimoen Creek-Klifon, Aug 1961, *P. van Royen & H. Sleumer* 6535 (L); Vogelkop Peninsula, Manokwari, Tafelberg, Oct 1961, *P. van Royen & H. Sleumer* 6687 (L); Vogelkop Peninsula, Aifat R valley, nr Sururem, Oct 1961, *P. van Royen & H. Sleumer* 7029 (L); Wandammen Peninsula, Wondiwoi Mts., Feb 1962, *C.F. Koster BW* 13643 (L); Bomberai Peninsula, Sjuga-Wagura area, Armina, May 1962, *V.W. Moll BW* 13034 (L); Kabupaten Manokwari, Arfak Plains Apr 1994, *M.J.S. Sands et al.* 6258 (L); Kabupaten Manokwari, Kecamatan Kebar, May 1994, *M.J.S. Sands et al.* 6575 (L); Kabupaten Manokwari, Arfak Mupi Dessa, Apr 1995, *Mahyar et al.* 321 (L); Bird's Head Peninsula, surr Ayawasi, Nov 1995, *C.E. Ridsdale* 2178 (L); Mimika Reg., PT-Freeport Ind Conc Area, toKaliKopi, Dec 1998, *M.J.S. Sands* 7217 (L); Mimika Reg., PT-Freeport Ind Conc Area, KualaKence, Mar 1999, *F.R. Willis et al.* 129 (L); Mimika Reg., PT-Freeport Ind Conc Area, NewEast lev, Apr 1999, *P.J. Rudall* 107 (L). **Papua:** Tami-Fluss zwischen den Eti- und Arson-Flüssen, Mar 1910, *K. Gjellerup* 4 (L); Dieni, Ononge Road, 1933, *L.J. Brass* 3870 (L); Gogol R., Ninam logging area, *Verdcourt et al.* 5133 (L); nr Horata village, Aug 1953, *R.D. Hoogland* 3571 (L); Naiesonge (Rawa), nr Gogol R nr Mawan village, Jun 1955, *R.D. Hoogland* 4929 (L); Sepik, Aitape, Pieni R nr Walwali vill., Jun 1961, *P.J. Darbyshire & R.D. Hoogland* 7989 (L); Morobe, Kalapit, Umi River, Jan 1963, *A.N. Miller & P. van Royen NGF* 15638 (L); Tymne-Wago track, Mar 1963, *T.G. Hartley* 11447 (L); Ossima village, Mar 1964, *D. Sayers NGF* 13209 (L); W bank of

Vailala R, c. 3 miles S of jnct w Lohiki R, Feb 1966, *R. Schodde & A.L. Craven* 4429 (L); nr Ambunti, May 1966, *R.D. Hoogland & L.A. Craven* 10149 (L); Tumam, c. 4 km E of Dreikikir, Jul 1966, *P.C. Hsylvigers* 1395 (L); Garagos, Nov 1966, *H. Streimann NGF* 27962 (L, SING); Wampit, Bupu village, Jul 1967, *A.N. Millar NGF* 22925 (L); Ramu, river nr Aiome, Mar 1968, *M.J.E. Coode NGF* 32759 (L); Vanimo subd., Ossima, Jan 1969, *H. Streimann & A. Kairo NGF* 39199 (L); Amanab subd., Bedwani mts, nr Kilifas on rv Yenabu, Mar 1970, *M.J.S. Sands* 1047 (L); Vanimo, Vanimo-hinterland, Dec 1971, *H. Streimann LAE* 53820 (L); Kerema, Vailala Riv, nr Lohike vill, Jun 1980, *E.E. Henty & P. Katik LAE* 72498 (L); Vanimo, Blackwater creek logg. area, Sep 1982, *K. Kerenga LAE* 56478 (L); Mawan, 1km E of Baku, Apr 1983, *A.N. Vinas AV* 226 (L); Angoram, Jul 1985, *L.J. Harkink* 15 (L); Amanab, above Aimane vill., Oct 1986, *O.G. Gideon LAE* 57565 (L); Bismarck Range, Ikil R tributary, Oct 1995, *W. Takeuchi* 10989 (L); Mt Jaya, Mimika Regency, Ecol.Plot 5, 1, 1998, *R.J. Johns et al.* 8748 (L, SING); Josephstaal FMA area, nr Kumamdeber, Jul 1999, *W. Takeuchi et al.* 13578 (L).

9. *Amischotolype hookeri* (Hassk.) H.Hara (Fig. 9F)

Amischotolype hookeri (Hassk.) H.Hara, *Flora Eastern Him.* I (1966) 399; Hong, *Acta Pytotax. Sin.* 12, 4 (1974) 461; *Fl. Reipubl. Pop. Sin.* 13, 3 (1997) 71; Hong & DeFilipps, *Fl. China* 24 (2000) 23 (See note). — *Forrestia hookeri* Hassk., *Flora* 47 (1864) 629; Commelin. Ind. (1870) 89; Clarke, *Commelyn. Cyrtandr. Bengal.* (1874) 61, tab.XLI; Clarke in A.Candolle & C.Candolle, *Monogr. Phan.* 3 (1881) 237 (see note); Hooker f., *Fl. Brit. India* 6 (1894) 384; Brückner in Engler & Prantl, *Nat. Pflanzenfam.* ed. 2 (1930) 169; Rao et al., *Proc. Indian Sci. Congr.* (1960) 366. SYNTYPES: *Hooker & Thomson s.n., s.d.*, India contin. regionem tropicam montium Khasiae (inter 1–4000') (W, K, M, G-DC, P, all *n.v.*; B photo (Barcode: B 10 0296341 / Imageld: 302934), L); *Hooker & Thomson s.n., s.d.*, reg. trop. Sikkim (G-DC, K, all *n.v.*).

Stem rhizome unknown; erect part 120–210 cm long, simple; internodes moderately 0.5 mm long hairy. **Sheath** 9–14 mm diam., 0.5(–1) mm long hairy and/or with one to several lines of 1.5–2 mm long, pale-yellowish hairs, mouth ciliate. **Leaf blade** 20–35 × 7–10.4 cm, 2.9–4.4 times as long as wide, smooth, base gradually to rather abruptly narrowed into indistinct pseudopetiole; lower surface on veins densely 0.1–0.5 mm long hairy, upper surface glabrous; submarginal hairs on lower surface and on margin, (0.5–)1.5–2 mm long, dense, whitish to yellow. **Inflorescence** on erect stem, sessile, 2–3.5 cm diam., dense with branches obscure, 10–25-flowered. **Pedicel** 0–0.7 mm long. **Sepals** 7–10 × 3–3.5 mm, not elongating in fruit, green to deep purple, glabrous or rarely sparsely 0.5 mm long ciliate margins and keel, tip hooded. **Petals** c. 9 × 2.5–3.5 mm, c. as long as sepals, white to pale pink, glabrous, margin unknown. **Stamens** filament c. 9 mm long, colour unknown, in upper 1 mm with 2 mm long hairs; anthers (2–)2.2–3 × 0.7–0.9 mm, colour unknown, thecae opening by a longitudinal slit. **Capsule** 9–14 × 5.5–7 mm, ovoid, longer than sepals by (1–)3.5–5 mm, whitish to red or purple, sparsely 0.5–1(–1.5) mm long hairy; valves free to fused in basal half; apex acute, lobes absent; style remnant 0.3–0.5 × 0.4 mm long, persistent. **Seeds** 2 per locule, aril colour unknown.

Chromosomes. $2n = 36$ (Kammathy 81236: L, E; unpublished but in agreement with Rao *et al.* 1960).

Distribution. India (Assam, West Bengal, East Bengal, Meghalaya, Sikkim), Bangladesh (Moulavi Bazar).

Ecology. Along stream in forest. Altitude: 1–600(–1500) m asl.

Notes. The species is only known from NE India and Bangladesh. Several authors included Yunnan in the distribution of this species (Hara 1966, Hong 1974, 1997 and Hong & DeFilipps 2000). However, I have not seen their specimens and their descriptions are wide enough to include also *A. divaricata*. Study of the specimens from Yunnan is needed to elucidate which of the two taxa are present.

Clarke (1881) mentioned the species for the island of Pinang (*Campelia marginata*, Wallich Cat. 8977 p.p., non Blume). In the Wallich collection at K-W (studied on microfiche), three sheets of Cat 8977 exist: one is 8977b, from Singapore (= *A. gracilis*); two are 8977a, from Pinang, one of them without doubt *A. marginata*; the identity of the second sheet cannot be ascertained from the microfiche. A fourth photo of Wallich Cat 8977 in K-W has been found on the Kew-website. The sheet has three branches, so is not entirely similar to the ones on microfiche (perhaps remounted?), and not indicated *a* or *b*: one with a creeping stem with inflorescences agreeing with *A. marginata*, one sterile, and one with inflorescences on the erect part of the stem. The latter two cannot be identified with certainty. If, however, one of the collections of Pinang is indeed *A. hookeri*, man must have brought it there, probably unintentionally with planting material for, for instance, the spice gardens (species of the genus are often found growing together with wild gingers) that were established on the island in 1794. Likewise, in Singapore it has only been found growing in the rain forest in the Botanic Gardens where it was undoubtedly introduced, either by accident or as an ornamental. It has not been observed in flower, and has not been collected for the herbarium. Clarke 37582 from Brunei is most likely mislabelled.

Specimens examined: INDIA. cult., Bot. Gardens of Calcutta and Serampore, 1834–1841, *J.O. Voigt s.n.* (P). **Assam:** *W. Griffith 1345* (BM); *Jenkins s.n.* (L, P); *Jenkins 9383* (BM); Naga hills, *Masters s.n.* (L, P); Naga Hills, Pereumi, Aug 1935, *N.L. Hor 6454* (K); Khasi Hills, Nongpoh, Jun 1949, *W.N. Koelz 23015* (L); K.&J. Hills Dist., nr Exp. Plot 2, Nongpoh, Feb 1962, *R.V. Kammathy 81236* (BM, E, K, L). **West Bengal:** Darjeeling, Selim, Sep 1869, *C.B. Clarke 9082* (K, SING); Darjeeling, Rishup, Oct 1870, *C.B. Clarke 13629A* (K); Darjeeling, Garidoora, May 1884, *C.B. Clarke 35539B,F* (BM, K); Tista, Jun 1913, *G.H. Cave s.n.* (E); Darjeeling, Jun 1923, *J.M. Cowan s.n.* (K). **East Bengal:** (1864), *W. Griffith 5487* (L, P). **Meghalaya:** montium Khasiae, *J.D. Hooker & T. Thompson s.n.* (BM, E, L, P, U); Khasia, Bhorlasa, Aug 1886, *C.B. Clarke 44469E* (BM). **Sikkim:** *J.D. Hooker s.n.* (BM, K, P); *J.D. Hooker & T. Thompson s.n.* (BM, E, L, P, U); Jun 1870, *C.B. Clarke 11805* (SING) & *11806B* (BM); Mongpo, Oct 1884, *C.B. Clarke 36264B* (K); Dulkajhar, Oct 1884, *C.B. Clarke 37048* (BM).

BANGLADESH. Moulavi Bazar: Adampur forest, Rajkandi range, Jun 2000, *A.M. Huq &*

M.K. Mia 10748 (L).

SINGAPORE. grown in Hort.Kew, 1904, *Anon.* 461-95 (K).

BORNEO. **Brunei:** Mar 1885, C.B. Clarke 37582 (BM).

10. *Amischotolype irritans* (Ridl.) I.M.Turner (Fig. 9G & 13C)

Amischotolype irritans (Ridl.) I.M.Turner, Novon 6 (1996) 221 & Gard. Bull. Sing. 47 (1997) 515. — *Forrestia irritans* Ridl., J. Straits Branch Roy. Asiat. Soc. 41 (1904) 38; Mat. Fl. Malay. Penins. 2 (1907) 124; Fl. Malay. Penins. 4 (1924) 361; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169; *non* Beaman & Beaman, The Plants of Mount Kinabalu 3 (1998) 109 (see note 1). LECTOTYPE (designated by Turner (1996)): *Ridley s.n.*, Peninsular Malaysia, Selangor, on the Tras Route at the 15th mile (SING).

Stem ascending from a creeping or scrambling rhizome up to 200 cm long; erect part 50–120 cm long, simple; internodes rather sparsely to densely 0.2–0.5 mm long red-hairy, hairs easily caducous, rarely glabrous. **Sheath** 10–20 mm diam., glabrous or rarely with a few 0.5 mm long hairs basally at the back, mouth glabrous or (towards pseudopetiole) ciliate. **Leaf blade** 23–44 × (4–)5–9 cm, 3.8–6.2 times as long as wide, smooth, base rather gradually narrowed into c. 5.5 cm long and 2–3 mm wide winged pseudopetiole; both surfaces moderately 1–2 mm long yellow- to orange-hairy; submarginal hairs on upper surface, 1–1.5 mm long, rather dense, yellow. **Inflorescence** on erect stem, sessile, 2.5–5 cm diam., very dense with branches obscure, 20–many-flowered. **Pedicel** c. 1.5 mm long. **Sepals** 6.5–10.2 (in flower), elongating in fruit to 10–13 × 1.5–2 mm, yellow-white or pale green (before and in flower) to pink or reddish purple (in fruit), moderately to rather densely 1.5–2.5 mm long spiny red-hairy, tip not hooded. **Petals** 9–10 × 1.8–2 mm, slightly longer than sepals, white, dorsal surface subapically with 2 mm long spot of 1–1.5 mm long, red-spiny hairs, margin at apex minutely fringed. **Stamens** with filaments 11–12 mm long, white, glabrous or in an upper part up to 2–3 mm below apex with few 2–3 mm long hairs; anthers 1.5–2 × 0.5–0.7 mm, white or yellowish, thecae opening by a longitudinal slit. **Capsule** 5.5–6 × 3.5–4 mm, narrowly ovoid, shorter than sepals by 3–4.5 mm, bright purple, apex 1–2 mm long, red spiny-hairy; valves free; apex slightly depressed, lobes absent; style remnant 0.5 × 0.2 mm, finally deciduous. **Seeds** 2 or rarely 1 per locule, aril colour unknown.

Distribution. Thailand (Peninsular Thailand: Pattani), Peninsular Malaysia (Kedah: Langkawi, Kelantan, Terengganu, Perak, Pahang, Selangor, Negeri Sembilan), Sumatera (N: Leuser, Asahan).

Ecology. Primary to rather disturbed, riverine or lowland dipterocarp forest, forest margin or forest regrowth, dry to wet (alluvial) soil. Altitude: 15–750 m asl.

Notes. 1. Ridley (1904, 1907) described it as a rather rare endemic of Peninsular Malaysia from mountain forests (2000 feet alt.). It has since been found at lower altitudes, in Sumatera (three times) and in Thailand (once). The species has been cited for Borneo (Beaman & Beaman 1998: *Clemens* 26141) but this is based on a misidentification of *A. monosperma*.

2. Ridley (1904, 1907) mentioned he had never seen fruits and he did not mention them in 1924. However, based on the number of collections with fruits, they are normally formed, and were for the first time collected in 1921 (SING: *Hume* 9382, Peninsular Malaysia: Selangor). The colour of the aril has never been annotated and, unfortunately, I have only seen them in flower in the field.

Specimens examined: THAILAND. **Peninsular Thailand:** Pattani. Aug 1923. *A.F.G. Kerr* 7516 (L. P).

PENINSULAR MALAYSIA. **Kedah:** Langkawi, Dec 1990. *Khairuddin Hj. Itam* 10 (KEP). **Kelantan:** path to Bukit Berangkat, via Kampong Perak, Bertam, Feb 1973, *Md.Shah & Md. Ali* 2867 (KEP. SING); Gua Musang, Relai Forest Reserve, Sep 1992, *Hamid* 13 (KEP). **Terengganu:** Kemaman. Bukit Kajang. Nov 1935. *Corner SF* 30238 (K. SING); Hulu Terengganu, Tasik Kenyir, Sg. Cicir, Aug 2007, *K. Imin et al. FRI* 58335 (KEP). **Perak:** 188x, *H.N. Ridley s.n.* (SING); Bujong Malacca. 1898. *H.N. Ridley* 9784 (SING); Pondok Tanjong Forest Reserve. Feb 1939. *G.H. Spare SF* 36220 (K. KEP. SING). **Pahang:** 7 mile Raub Road. Jul 1924, *G.A. Best SF* 14132 (SING); Sungai Tahan, near Kuala Teku, Sep 1928. *R.E. Holtum SF* 20810 (SING); Gunung Serudom. Kuantan. Oct 1975, *Md.Shah et al.* 3762 (KEP, KLU, SING); Jerantut, Taman Negara. Gunung Tahan, Sunga Kelam. Aug 1996. *R Kiew* 3991 (L); Temerloh, Krau GR, Sg. Perlok, Nov 2000, *S. Damahuri & K. Ayau FRI* 43603 (L). **Selangor:** on the Tras route at the 15th mile. 1897. *H.N. Ridley s.n.* (SING); Semempik, Jul 1921. *H.L. Hume* 8093 (SING); Ginting Simpak. Oct 1921. *H.L. Hume* 9382 (SING); 16 mile Ulu Gombak. Oct 1937, *Md.Nur SF* 34211 (SING); Ulu Gombak. Jun 1966, *J.C. Carrick* 1485 (K, L. SING); Lalang FR. Semenyih. Kajang, Oct 1967, *J. Dransfield s.n.* (KLU); Pahang border. Gentiang Sempah trail. Sep 1973. *B.C. Stone* 11661 (KLU); Gombak. Ulu Gombak Forest Reserve, Sep 1974, *Tho Yow Pong FRI* 21544 (KEP. L); Ulu Langat, road to JKR Quarry, Jul 1984, *R Kiew* 1335 (SING); N. of Kuala Lumpur, Jln Gombak km36 (KL). Jun 2005, *H. Duistermaat* 351 (L. SING). **Negeri Sembilan:** Sungei Ujong. Kupayang. Nov 1885. *Y.H. Alvins* 2202 (SING); Gunung Angsi, Jun 2005, *H. Duistermaat* 346 (L, SING).

SUMATERA. **Aceh:** Leuser. Kluet NR. along Krung Lembang. Jul 1985. *W.J.J.O. de Wilde & B.E.E. de Wilde-Duyfjes* 19846 (L). **Sumatera Utara:** Asahan, East Coast. Vale of Tangga, May 1927, *H.H. Bartlett* 7707 (L); East Coast, vicinity of Tomoean Dolok. Aug 1936. *Rahmat Si Boeea* 10005 (L).

11. *Amisshotolype laxiflora* (Merr.) Faden (Fig. 10A & 14A–B)

Amisshotolype laxiflora (Merr.) Faden in Coode et al., Checklist Fl. Plants & Gymn. Brunei Dar. (1996) 352, 434; Cowley & Furness, Kew Bull. 52 (1997) 469. — *Forrestia laxiflora* Merr., Philipp. J. Sci. 29 (1926) 354. TYPE: *Castro & Melegrito* 1618, August 1923, Malaysia, Sabah, Banguay Island, in forests, altitude about 30 m (holo UC. n.v.: iso K, BO).

Forrestia marginata auct., sensu Hallier f., Beih. Bot. Centralbl. 34 (1916) 47, p.p. (see note 1); non Blume.

Stem ascending from trailing, 100–150 cm long rhizome; erect part 20–75 cm long, simple; internodes glabrous or sparsely to moderately 0.1–0.3 mm long hairy. **Sheath** 6–14 mm diam., with several moderate to dense lines of (2–)3–5 mm long, yellow(-brown) hairs, mouth ciliate. **Leaf blade** 15–32 × (2.7–)4–8(–9.7) cm, 2.6–4(–5.2) times as long as wide, bullate, lower surface often purple, base gradually to rather abruptly narrowed into an indistinct winged pseudopetiole to 4 cm long and 4 mm wide; lower surface glabrous or midvein in lower half with 1–2 mm long yellowish hairs or rarely 0.1 mm long colourless- to brownish-hairy, upper surface glabrous or rarely 0.1 mm long hairy; submarginal hairs on upper surface or rarely absent, 0.1–0.5(–0.8) mm long, sparse to rather dense, colourless or yellow. **Inflorescence** on rhizome or at knee, peduncle (0–)3–15 mm long, 2–5 cm diam., rather dense to very lax with branches obscure or the longest 0.8–3 cm long, 15–many-flowered. **Pedicel** 1.5–2.5 mm long. **Sepals** (9–)10–14 × 1.5–2.5 mm, slightly elongating in fruit, white, green, pinkish or red-purple (in flower) and purple (and green), red, magenta or violet (in fruit), glabrous or sparsely 0.5 mm long ciliate margins and keel, tip hooded. **Petals** c. 6 × 2 mm, shorter than sepals, white to yellow, glabrous, margin entire. **Stamens** with filaments c. 5 mm long, white, upper 2 mm with many 2 mm long hairs; anthers 1 × 0.9 mm, cream-coloured or yellow, thecae opening by a longitudinal slit. **Capsule** 5.5–8.5 × 3.5–5.5 mm, obovoid, shorter than sepals by 2–5 mm, red or purple, glabrous or apex to upper half sparsely 0.2–0.5 mm long hairy; valves (almost) free; apex depressed, lobes absent; style remnant 0.3 × 0.3 mm, deciduous. **Seeds** 2 per locule, aril orange.

Distribution. Borneo (Sabah: West Coast, Interior, Kudat, Sandakan, Tawau, Sarawak: Kuching, Sri Aman, Kapit, Bintulu, Miri; Kalimantan: W, C, E, S), Sulawesi (S).

Ecology. Primary or disturbed mixed dipterocarp, riparian or swamp forest, along streams, in wet or swampy places, on loam soil, often on limestone. Altitude: 0–800 m asl.

Notes. 1. The species was originally described from Banguay Island (N Sabah). It has been collected outside Borneo only once, in Sulawesi (*van Balgooy* 3910). It is often identified as the widespread *A. marginata*, which also occurs on Borneo, and from which *A. laxiflora* differs as mentioned in the key (lead 9). *Kessler et al.* 938 appears to be a mixture of the two species, showing that the species can even grow in mixed populations: the specimen in L is *A. laxiflora*, in US it is *A. marginata* (n.v.; pers. comm. R.B. Faden).

2. The roots are said to have medicinal value (*Forman* 452, E. Kalimantan, Gunung Sahari).

Specimens examined: BORNEO. **Sabah:** West Coast: Ranau, Sungai Lakus, Kg. Segindai, Aug 1983, *S. Dewol et al.* SAN 100162 (L, SAN); Interior: Pensiangan Kayu FR, Jul 1992, *K.*

Fidilis SAN 136002 (KEP, L); Pensiangan, Pun batu, along the path to limestone, Oct 1996, *A. Berhaman et al.* 139 (SAN); Kudat: Banguay Island, 1923, *P. Castro & F. Melegrito* 1618 (BM, BO, K); Sandakan: Bettotan, near Sandakan, Jul 1927, *Boden-Kloss* SF 18736 (K, SING); Kabili FR, May 1935, *H.G. Keith* 38907 (KEP); Kabili forest reserve, May 1935, *H.G. Keith* 4531 (L, SING); Gomantong, Feb 1960, *W. Meijer* SAN 20549 (SAN); Sepilok FR, Aug 1968, *K. Ogata* 10790 (L); Sepilok FR, Dec 1975, *P.F. Stevens et al.* 328 (KEP, L); Sepilok FR, Oct 1979, *R. Kiew* 786 (KEP); Sepilok FR, Oct 1981, *Kwiton Jong* SAN 93914 (SAN); Kinabatangan, Sungai Menanggul, Feb 1985, *Amin & Matin* SAN 69950 (SAN); Lahad Datu, Danum Valley, West Trail, Feb 1986, *S. Andrews* 725 (E, SAN); Lahad Datu, Ulu Segama, Danum Valley, at entrance to west trail, Mar 1987, *G. Argent et al.* GA 671987 (E, L, SAN); Lahad Datu, Danum valley, Sep 1987, *Campbell* 23/9/4 (E); Lahad Datu, Lahad Datu, Tabin Wildlife Sanctuary, Aug 1991, *L. Madani* SAN 132613 (KEP, L); Lahad Datu, Lahad Datu, Tabin WR, trail to Lipad mudvolcano, May 1998, *F. Borchsenius* 513 (SAN); Tawau: floodplain of Tawau River, Tawau Hills Park, Jun 1984, *J.H. Beaman* 10210 (K); Tawau Hills NP, path to waterfall, May 2005, *J.J. Vermeulen in H. Duistermaat* 357 (L); **Sarawak**: Kuching: lower slopes gng Lundu, *B.L. Burt & P.J.B. Woods* 2723 (E); Sri Aman: Bukit Danau, Aug 1938, *Daud & Tachun* SF 35750 (KEP, SING); Kapit: Belaga, hills behind airfield, Apr 1963, *P.S. Ashton* S 18262 (L); Sungai Apa, Mar 1975, *P.C.K. Chai* S 36195 (KEP, L); Belaga, Ulu Belaga, Sungai Semawat, Oct 1981, *C. Hansen* 716 (KEP, L, SING); Ulu Sg. Balleh, Sungei Sedupak, *Yii P.C. et al.* S 52067 (KEP, L); Belaga, Ulu Batang Balui, Ulu Sungai Kebhor, Mar 1989, *Yii P.C.* S 62338 (L); Song, Ulu Katibas, trib.Sg.Beloh, Sg.Joi, Jun 1993, *Yii P.C. et al.* S 64900 (L); Bintulu: Tatau, Bukit Sarang group, Bukit Lebik, Aug 2005, *J.J. Vermeulen in H. Duistermaat* 401 (L, SING); Miri: Subis, Niah., Oct 1954, *Ahmad* 5 (SING) & 5 (B) (SING); Marudi, Gng Api, gorge on S side, Feb 1966, *J.A.R. Anderson* S 24025 (L); Marudi, C.Mulu NP, Sg.Mendalam, Oct 1977, *J.A.R. Anderson* S 39393 (L); Marudi, Dulit Range, Sg Sirui, Oct 1983, *Dyg. Awa & Yii P.C.* S 46611 (L); valley in front of Niah Caves, *B.L. Burt & P.J.B. Woods* B 2008 (E); **Kalimantan W**: Liang Gagang, "Oberlauf des Manddeistromes", Mar 1894, *H. Hallier* B3001 (L); Sungei Pary, 1896/97, *Jaheri (Exped. Nieuwenhuis)* 1136 (BO); Gn Palung NR, 100 km S of Pontianak, Jun 1986, *M. van Balgooy & A.K. van Setten* 5618 (L). **Kalimantan C**: Bukit Raya, Tumbang Tapi, Jan 1983, *H. Wiriadinata* 3357 (L). **Kalimantan E**: W. Koetai, n.5 nr Lahoen, Jun 1925, *F.H. Endert* 1768 (L, SING); W.Koetai, Aug 1925, *F.H. Endert* 2790 (L); E.Kutei, Sg. Susuk region, Jul 1951, *A. Kostermans* 5744 (L); Gunung Sahari, Belajan river, Aug 1956, *L.L. Forman* 452 (L); Balikpapan, Wanariset, Sep 1982, *Ramlanto* 8 (L); Wanariset area, Samboja-Semoi km 11, Feb 1991, *Ambri & Arifin* W 647 (L); PT. ITCI, Kenangan-G. Meratus km 69, Mar 1995, *P. Kessler et al.* 938 (L). **Kalimantan S**: Kabupaten Tabalong, Jul 2000, *K. Sidiyasa & Z. Arifin* 2137 (L). **SULAWESI. S**: Soroako-Wasuponda Road, km 19, Jul 1979, *M. van Balgooy* 3910 (K, KLU, L).

12. *Amischotolype leiocarpa* (Hallier f.) Duist. **comb. nov.** (Fig. 10B)

Forrestia rostrata Hassk. var. *leiocarpa* Hallier f., Beih. Bot. Centralbl. 34 (1916) 49; Merrill, J. Straits Branch Roy. Asiat. Soc. (1921) 113. TYPE: *Hallier f. B3002*, 29 March 1894, W. Borneo, Liang Gagang (holo BO, n.v.; iso L).

Stem rhizome unknown; erect part 90–200 cm long, stilt roots sometimes present, simple; internodes glabrous or moderately to densely 0.2–0.3 mm long hairy. **Sheath** 5–9 mm diam., glabrous or moderately 0.2–0.5 mm long hairy, mouth (sparsely)

ciliate. **Leaf blade** 18–28 × (3.3–)4–7(–10) cm, (2.4–)3–6(–7.6) times as long as wide, base rather to very abruptly narrowed into 1.5–5 cm long and 1 mm wide winged pseudopetiole; lower surface glabrous or rarely moderately 0.2 mm long hairy, upper surface glabrous; submarginal hairs absent or on lower surface, rarely on upper surface, 0.1–0.3 mm long, sparse. **Inflorescence** on erect stem, peduncle 0–5 mm long, 1.6–3.5 cm diam., (rather) lax or rarely dense with longest branches 0.3–1.3 cm long, 10–30-flowered. **Pedicel** 1–1.5 mm long. **Sepals** 4.5–6.5 × 2–3 mm, not elongating in fruit, green or reddish, glabrous or very sparsely 0.2–0.3 mm long ciliate keel and margins, tip hooded. **Petals** unknown. **Stamens** with filaments unknown; anthers with thecae opening by a longitudinal slit in upper half only, otherwise unknown. **Capsule** 6.5–8.5 × 3.8–6.5 mm, short-pyriform, longer than sepals by 1.5–4.5 mm, (light) green to reddish or purplish, glabrous; valves (almost) free; apex (slightly) depressed, lobes absent; style remnant 0.5–1.5 × 0.2–0.3 mm, persistent. **Seeds** 2 per locule, aril orange.

Distribution. Borneo (Sabah: West Coast, Interior, Sandakan; Sarawak: Kapit, Miri; Kalimantan: W).

Ecology. Primary or logged over mixed dipterocarp (hill or riparian) forest, on hillside or along stream, moist, rocky or on granite. Altitude: (230–)500–1200(–1500) m asl.

Notes. 1. Described as a variety of *A. rostrata* by Hallier (1916), said to differ from the species only in the entirely glabrous capsules. However, this study revealed differences in the number of flowers per inflorescence, the length and shape of the capsule, and the valves being free or fused, warranting its recognition at species level. It is endemic to Borneo.

2. Most collections are in fruit. The single collection with anthers was returned from loan before all details were described (*Kokawa & Hotta 4846*, SAN; in L without anthers).

Specimens examined: BORNEO. **Sabah:** West Coast: Dallas, Sep 1931, *J. & M.S. Clemens* 26396 (BM); Mount Kinabalu, Dallas, Oct 1931, *J. & M.S. Clemens s.n.* (BM); Mount Kinabalu. Penibukan, Jan 1933, *J. & M.S. Clemens s.n.* (BM); Kota Belud, Mt Kinabalu, Mahandui river, Mar 1933, *C.E. Carr SF 26297* (SING); Mt Kinabalu, Penibukan, Mar 1933, *J. & M.S. Clemens* 32085 (BM, L); Ranau, Kinabalu NP, along Sg. Mamut, nr Poring, Feb 1969, *S. Kokawa & M. Hotta 4846* (L, SAN); Kinabalu, Penibukan, Bahandoi (Sg Tahubang), Mar 1970, *H.P. Nooteboom & Aban 1503* (L, SAN); Ranau, Langanan Fall, Poring, Feb 1989, *E.P. Tay et al.* 247 (KEP, SING); Kota Belud, Kinabalu P, Kg. Sayap, end rd to Wariu Waterfall, Jan 1991, *Jamili Nais SNP 4674* (SAN); Kota Belud distr, Kpg Sayap, Kemontis, May 1996, *Yalin Surunda 101* (KEP); Kota Belud, Kinabalu P, Sayap, Lumangis trail, Jun 2000, *A.D. Poulsen et al.* 1620 (SAN); Ranau, Ulu Tungud FR, Jul 2005, *L.G. Saw et al.* SAN 146080 (KEP); Interior: Tambunan, Mt. Trusmadi, Mar 1969, *H.P. Nooteboom 1475* (L, SAN); Tenom, Kaang, Mar 1987, *Asik Mantor SAN 120105* (SAN); Keningau, Hs. Trusmadi, May 1988, *J. Bousi et al.* SAN 123971 (SAN); Trus Madi FR, May 1988, *B. Joseph et al.* SAN 124017 (E, KEP, L); Sandakan: Lahad Datu, Ulu Segama, Dec 1982, *K. Fidilis SAN 95555* (KEP, L, SING). **Sarawak:** Kapit: Belaga, Batang Balui, Ulu sg Penuan, NWsl BtTasu, Mar 1987, *Yii P.C. S*

53627 (L); Miri: Marudi, Mulu National Park, May 1985, *A.P. Abang Mohtar & I. Othman* S 49695 (KEP); Marudi, Sg Silat Bassin, Sg Palutan, Mar 2003, *N. Normaya et al.* S 91072 (KEP). **Kalimantan W:** Liang Gagang, Mar 1894, *H. Hallier* B3002 (L); Serawai, Feb 1995, *A.C. Church et al.* 1971 (L).

13. *Amischotolype lobata* Duist. **sp. nov.** (Fig. 4)

Cum Amischotolype mollissima capsulae apicis lobis longis congruens, pseudopetiolo angustissime alatis, laminis supra venis distinctis, capsulis calyce superantibus pilis setosis differt. TYPUS: *Argent et al.* SAN 108301, March 1985, Malaysia. Sabah, Lahad Datu, Ulu Sg. Segama (holo SAN, iso E).

Stem ascending from rhizome; erect part 50–150 cm long, simple; internodes glabrous or rather sparsely to moderately 0.3–0.7 mm long hairy. **Sheath** 6–13 mm diam., moderately 0.3–0.5 mm long hairy at least at the front in upper half and/or with a few lines of 2–4 mm long, yellow-brown hairs, mouth (sparsely) ciliate. **Leaf blade** (17–)25–33 × (3.7–)5.6–7.5 cm, 3.7–5.7 times as long as wide, lower surface purplish or not, base very abruptly narrowed into 3.5–9.5 cm long and 0.5–1 mm wide winged pseudopetiole; lower surface sparsely to densely 0.2–0.5(–1) mm long hairy or rarely glabrous, upper surface with veins very distinct, glabrous or sparsely to moderately 0.2 mm long hairy or rather sparsely 1.5–3 mm long hairy near midvein; submarginal hairs on upper surface, 1.2–2 mm long, dense, yellow. **Inflorescence** on erect stem, sessile, 2–3 cm diam., dense with branches obscure, 10–40-flowered. **Pedicel** 1–1.5 mm long. **Sepals** 9–11.5 × 3–4.5 mm, not elongating in fruit, white and purplish tinged or pale green (in flower) to magenta or purple (in fruit), glabrous or sparsely to moderately 0.5–0.7 mm long ciliate margins and keel, tip hooded. **Petals** c. 8 × 2 mm, shorter than sepals, colour unknown, glabrous, margin unknown. **Stamens** with filaments c. 6 mm long, colour unknown, upper 2 mm with 0.5–1 mm long hairs; anthers 1.2 × 0.6 mm, colour unknown, thecae opening by a longitudinal slit. **Capsule** 7.5–10 × 5.5–6 mm, obovoid, 1 mm shorter to 0.5–1 mm longer than sepals, green, upper 1/3 to half moderately 1–2 mm long, yellowish bristle-hairy; valves (almost) free; apex depressed, lobes 1–1.5 mm long lobes; style remnant absent. **Seeds** 2 per locule, aril colour unknown.

Distribution. Borneo (Sabah: West Coast, Interior, Kudat, Sandakan, Tawau; Kalimantan: E).

Ecology. Primary, severely logged-over or secondary dipterocarp hill or riverine forest, on sandstone. Altitude: 90–800 m asl.

Notes. The species is endemic to the northeastern part of Borneo, mostly Sabah, and only one collection is from East Kalimantan (*Geesink* 9284). Even vegetatively, this species is readily recognised by the distinct and only very narrowly winged pseudopetioles and the distinct veins on the upper surface of the leaf blade. In fruit, the



Fig. 4. *Amischotolype lobata* Duist. **A.** Habit. **B.** Immature fruit with persistent sepals. Drawing by A. Walsmit Sachs, from *R. Geesink 9284* (L).

long lobes at the apex of the capsule are striking (hence the name); this is a character it shares only with *A. mollissima*. Differences from *A. mollissima* include the shape of the leaf blades, the bristly hairs on the capsules, and the capsules generally exceeding the sepals.

Specimens examined: BORNEO. **Sabah**: West Coast: Ranau. NW of Kampong Pinawantai. May 1973, *G. Shea & Aban SAN 76938* (SAN); Ranau, c. 8 miles from Kampung Merungin. Nov 1975, *Leopold & Saikeli SAN 82580* (SAN); Interior: Tenom, Crocker Range, Melalap. Sg Losong. Nov 1968, *K. Ogata 11466* (L); Sipitang. G.Lumaku. Mar 1969, *H.P. Nooteboom 1119* (L); Kudat: Kota Marudu, Kampong Monggis, May 1996, *M. Rumutom 287* (KEP); Sandakan: Labuk Sugut. W-side of Bt Doji and Telupid-UluKaram. Oct 1968, *S. Kokawa & M. Hotta 485* (L); Kinabatangan. Sungai Kuamut, Jan 1976, *P.F. Stevens et al. 439* (KEP. L); Lahad Datu. N. of camp 3 Ulu Sg. Danum, Sep 1976, *B.C. Stone et al. SAN 85248* (KLU); Mt.Tawai FR Karamuak. Jul 1978, *S. Dewol & M. Alexius SAN 88695* (SAN); Lahad Datu. Ulu Sg.Segama. Mar 1985, *G. Argent et al. SAN 108301* (E. SAN); Lahad Datu. Danum Valley W1355, Oct 1985, *M.J. Still SAN 112110* (SAN); Lahad Datu, Danum Valley, Palum Tambun Nature Trail, Jul 1990, *Campbell EG 109* (E); Kinabatangan. Sungai Imbak. Jun 2000, *A.D. Poulsen & K. Kjeldsen 1609* (AAU. KEP); Tawau: Tawau hill park. Apr 1992, *A. Berhaman et al. SAN 134514* (SAN). **Kalimantan E**: Papadi-Pamilau, Aug 1981, *R. Geesink 9284* (L).

14. *Amischotholype marginata* (Blume) Hassk. (Fig. 10C. 14C–D, 15A–F & 16A–B)

Amischotholype marginata (Blume) Hassk., Flora 46 (1863) 392; Turner, Gard. Bull. Sing. 45 (1993) 53; Coode et al., Checklist Fl. Pl. Gymn. Brun. Dar. (1996) 352; Turner, Gard. Bull. Sing. 47 (1997) 515; Beaman & Beaman, The Plants of Mount Kinabalu 3 (1998) 110; Keng et al., Conc. Fl. Sing. Volume II: Monocotyledons (1998) 23. — *Campelia marginata* Blume, Enum. Pl. Javae (1827) 7; Kunth, Enum. pl. 4 (1843) 109; Moritz, Syst. Verz. (1845–46) 93; Zollinger, Syst. Verz. (1854) 65; Miquel, Fl. Ned. Ind. 3 (1855) 547. — *Forrestia marginata* (Blume) Hassk., Flora 47 (1864) 630, *p.p.* (see note 5); Commelin. Ind. (1870) 90, *p.p.*; Clarke in A.Candolle & C.Candolle, Monogr. Phan. 3 (1881) 237; Hooker f., Fl. Brit. India 6 (1894) 383; Ridley, J. Straits Branch Roy. Asiat. Soc. 33 (1900) 170; Mat. Fl. Malay. Penins. 2 (1907) 123 (see note 3); Koorders, Exkursionsfl. Java 1 (1911) 282; Hallier f., Beih. Bot. Centralbl. 34 (1916) 47, *p.p.*; Merrill, J. Straits Branch Roy. Asiat. Soc. (1921) 113; Ridley, Fl. Malay. Penins. 4 (1924) 360; Brückner in Engler & Prantl, Nat. Pflanzenfam. ed. 2 (1930) 169; Cherfils in Lecomte, Fl. Gen. Indo-Chine 6 (1937) 856, t.85, f. 1–3 (*'marginatus'*; see note 4); Keng, Gard. Bull. Sing. 40 (1987) 124 (see note 3). — *Forrestia mollissima* (Blume) Koord. forma *marginata* (Blume) Backer, Handb. Fl. Java I, 3 (1924) 33; Backer & Bakhuizen van den Brink, Fl. Java 3 (1968) 15. — *Amischotholype mollissima* (Blume) Hassk. forma *marginata* P.H.Hô. Câyno Vietnam 3, 1 (1993) 478, illus. (*'Amischotholype'*), *nom. inval.*, no basionym (see note 4). TYPE: *Blume s.n.*, 'In umbrosis montium Gede, Salak, etc.' (holo L).

Forrestia hispida auct., sensu Hook.f., Bot. Mag. 90 (1864) t.5425; non A.Rich.

Stem finally ascending from creeping and branched, up to 300 cm long rhizome; erect part 30–100 cm long, simple; internodes glabrous to rather densely 0.2–0.5 mm long (red-)hairy. **Sheath** (6–)10–20(–24) mm diam., with a purple tinge or not, with few to many lines of 1–6 mm long, yellowish hairs, rarely glabrous or densely 0.1–0.5 mm long red-hairy, mouth ciliate. **Leaf blade** (15–)20–35(–46) × (3.4–)4.5–7(–10.6) cm, (3.1–)4–6(–7) times as long as wide, bullate, lower surface purple or not, base gradually to rather abruptly narrowed into an indistinct or 2–3 cm long and 2–3 mm wide winged pseudopetiole; lower surface glabrous or sparsely to very densely 0.1–0.5(–1) mm long hairy or rarely midvein in lower half with 2–3 mm long hairs, upper surface glabrous or rarely sparsely to moderately 0.1–0.5 mm long hairy; submarginal hairs on upper surface, 0.1–0.5(–1) mm long, rather sparse to moderately dense, colourless or yellowish. **Inflorescence** on rhizome and knee, peduncle 2–15 mm long, (1–)2.5–5(–6.5) cm diam., rather dense to very lax with branches obscure or longest 0.3–3 cm long, 20–many-flowered. **Pedicel** 0–0.5 mm long. **Sepals** (6–)7–10 × (2–)3–4(–5.5) mm, not or slightly elongating in fruit, cream to beige or yellow-brown in flower, pink to (red-)purple in fruit, glabrous to rather densely 0.2–0.5(–1) mm long colourless- or red-hairy mostly on keel, tip hardly to distinctly hooded. **Petals** 5.5–8.0 × 2.5–4.2 mm, slightly longer than sepals, white, glabrous, margin entire or minutely fringed. **Stamens** with filaments c. 8 mm long, white, in upper 2–3 mm with many 3–4 mm long hairs; anthers 1–1.6 × 0.8–1.4 mm, yellow, rarely pink, red, blue or purple, thecae opening by a longitudinal slit. **Capsule** 6–8.5 × 3.5–4.5 mm, narrowly obovoid, 1.5(–2) mm shorter to 1.5(–3) mm longer than sepals, pink to red-purple, glabrous or apex to upper half sparsely 0.1–0.5(–1) mm long hairy; valves free; apex depressed, lobes absent; style remnant 0.5 × 0.2 mm, finally deciduous. **Seeds** 2 per locule, rarely 1 abortive, aril orange.

Distribution. Myanmar (Tenasserim), Thailand (SW: Kanchanaburi, Petchaburi; Peninsular Thailand: Ranong, Nakhon Si Thammarat, Trang, Satun, Pattani, Narathiwat), Peninsular Malaysia (Kedah: Langkawi and mainland, Penang: Pulau Pinang, Kelantan, Terengganu, Perak, Pahang, Selangor, Negeri Sembilan, Malacca, Johor), Singapore, Sumatera (Aceh, Sumatera Utara, Sumatera Barat: Kepulauan Mentawai, Riau, Kepulauan Riau, Jambi, Palembang: Bangka Island, Lampung), Java (West: Bogor, Bandung, Priangan), Philippines (Palawan: Puerto Princesa, Brooke's Point), Borneo (Brunei; Sabah: West Coast, Interior, Sandakan, Tawau; Sarawak: Kuching, Samarahan, Sri Aman, Betong, Bintulu, Miri, Limbang, Kapit; Kalimantan: W, C, SE, E), Sulawesi (Central).

Ecology. Lowland dipterocarp, peat swamp or montane primary, disturbed or old secondary, evergreen or (semi-)deciduous forest, in deep to partly shaded or open vegetation in valley, along streams, in forest clearings or margins or on roadsides, on rather dry to wet, rocky or clayey (volcanic) soils with humus absent or present, on sandstone, shale, granite or limestone (terra rossa). Altitude: 0–1500 m asl.

Notes. 1. This species is variable with respect to sheath indumentum and width, and leaf blade indumentum and dimensions. Whether this is ecologically induced variation

could not be established from herbarium material alone.

2. Cleistogamy is suspected in at least one collection (*Duistermaat 350*, Peninsular Malaysia, Selangor, Gombak), in which the anthers shed their pollen in tightly closed flowers.

3. In Singapore, there is only one record from the wild (*Ridley 6433*, 1892, Bukit Timah, Fern Valley). Despite serious attempts we were unable to refind the population. Ridley (1907, 1924) and Keng (1987) cited *Wallich 8977b* for Singapore, but as seen from microfiche (K) this is *A. gracilis*; although *Wallich 8977a* is *A. marginata*, this specimen is from Penang. At present, the species is growing in the rain forest of the Singapore Botanic Gardens, but the origin of that population is at best uncertain.

4. Although the species has been reported for Lao P.D.R. and Vietnam (Cherfils 1937; Ho, 1993), I doubt its presence there. Material identified by Cherfils as *F. marginatus* are *A. glabrata* (*Balansa 4100*, *Eberhardt 3277*) and *A. divaricata* (*Thorel s.n.*). I have not seen any material of *A. marginata* from Lao P.D.R. nor Vietnam. The description by Cherfils (1937) includes long rhizomes, and inflorescence in the part of the stem where the leaf blade has been shed, i.e., the rhizome. These characters agree with *A. marginata*. However, the illustrations and other parts of the description conflict with this species. Both cited sources illustrate a plant with the inflorescence on the node that also bears a leaf with the leaf blade still attached, i.e., flowering on the erect stem. Also, sepals are reported as 4.5–9 mm long and thecae as opening in the apical region, whereas in fact sepals are at least 6 mm long and the thecae open by a longitudinal slit only. It seems that a description of *A. marginata* was copied, supplemented with characters from material of at least one other species. (See also note 2 under *Amischorotolype*.)

5. *A. laxiflora* and *A. monosperma* are quite similar in habit with inflorescences on the rhizome, but differ in width of sepals, and colour of indumentum.

Specimens examined: MYANMAR. **Tenasserim:** Tavoy distr. Aug 1961, *J. Keenan et al. 972* (E); Tawer distr. Yebyu Township, E of Kanbauk, Oct 1998, *J.F. Maxwell 98-1092* (L). THAILAND. **SW:** Kanchanaburi, Between Khao Yai and Khao Ngai Yai, E of Sangkhla, Apr 1968, *C.F. van Beusekom & C. Phengkhilai 411* (E, L, P); Petchaburi, Kaeng Krachan NP, Khao Phanoen Thung, km no 30, May 2008, *P. Phonsena et al. 6006* (L). **Peninsular Thailand:** Pattani, Bachaw, Jul 1923, *A.F.G. Kerr 7181* (P); Trang, Chawrj, Apr 1928, *A.F.G. Kerr 15185* (L); Ranong, Khao Saideng, near Ranong, May 1968, *C.F. van Beusekom & C. Phengkhilai 542* (E, P); Nakhon Si Thammarat, Khao Luang area, May 1968, *C.F. van Beusekom & C. Phengkhilai 846* (E, P); Waterfall at Yala, Oct 1970, *Ch. Charoenphol et al. 4132* (KLU); Khao Khlong Yang at Khao Phra Mi, Jul 1972, *K. Larsen et al. 30655* (KLU, L); Satun, Kuan Kah Long, Tong Sgui subdistr. nr Nam Rah vill, Aug 1984, *J.F. Maxwell 84-100* (SINU); Nakorksitaprarat, Lansagah, Gahrome Falls, Khao Luang Nat.Park, Apr 1985, *J.F. Maxwell 85-400* (SINU); Trang, Kao Chong Nat.Park, Jul 1987, *Samsuri Ahmad 35* (SINU); Narathiwat, Khao Chana, Kaluwotai, Narathiwat, Sep 1995, *C. Niyomdham 1047* (P). PENINSULAR MALAYSIA. **Kedah:** Kedah Peak, Jun 1893, *H.N. Ridley s.n.* (SING); Langkawi, Gunung Raya Forest Reserve, Mar 1939, *Md.Nor 31378* (KEP); Gunung Bongon Forest Reserve, Jun 1941, *G.H. Spare 3786* (SING); Langkawi, G.Raya, ascent from SE near

the base, Aug 1972, *B.C. Stone 10932* (KLU); Langkawi, N base of G.Raya, due S of Kg.Sg. Itau, Nov 1979, *B.C. Stone 14314* (KLU); Langkawi, Dec 1990, *Khairuddin Hj. Iam 3* (KEP) & 5 (KEP); Kuala Muda, Gng Jerai FR, Titi Hayun, compt 20., Jul 2006, *K. Imin et al. FRI 50747* (L, KEP, SING). **Penang:** Pulau Pinang, *N. Wallich 8977a* (BM, E, K); Pulau Betong, Aug 1884, *C. Curtis 1948 (A)* (SING) & *1948 (B)* (SING); Pulau Betong, 189x, *Gnard (Ridley) 2* (BM); Governement Hill, May 1898, *C. Curtis s.n. (A)* (SING) & *s.n. (B)* (SING). **Kelantan:** Ulu Sg. Lebir, 1.5 mi S of Sg. Ternya, Sep 1967, *B.C. Stone 7317* (KEP, KLU, L). **Terengganu:** Kemaman, Bukit Kajang, Nov 1935, *E.J.H. Corner s.n.* (SING); Kemaman, Sungai Nipah FR, Cptmt 56, Sungai Ayam, May 2006, *A.R. Rafidah et al. FRI 51647* (KEP, L, SING); Hulu Terengganu, Ulu Telemong FR, Jul 2006, *S.N. Phoon et al. FRI 51960* (KEP); Hulu Terengganu, Petuang FR, Jul 2006, *S.N. Phoon et al. FRI 51977* (KEP); Hulu Terengganu, Tasik Kenyir, Sg. Cendana, Aug 2007, *K. Imin et al. FRI 58538* (L, KEP). **Perak:** Taiping Hill, Dec 1892, *H.N. Ridley 11422* (K, SING); Maxwell's Hill, 1892, *H.N. Ridley s.n.* (SING); Taiping Hills, Feb 1904, *H.N. Ridley s.n.* (SING); Temango, Jul 1904, *H.N. Ridley s.n.* (SING); Lenggong, Aug 1904, *H.N. Ridley 14375* (BM, SING); Gunong Bujang Malaka, Aug 1959, *Kadim bin Tassim 457* (SING); Bukit Kinta FR, Apr 1987, *R. Kiew 2588* (KEP); Hulu Perak, Temenggor FR, Sungai Halong, Aug 1993, *M. Abdul Latiff et al. 3943* (KEP, L); Belum, near Sg. Halong, Sep 1993, *I.M. Turner & J.W.H. Yong 31* (SINU); Hulu Perak, Belum FR, Sungai Kejar, Sg. Kejar, Jun 2007, *S. Syahida Emiza & Kueh H.L. FRI 55186* (KEP, L). **Pahang:** Pulau Tioman, Aug 1889, *H.N. Ridley s.n.* (SING); Telom, Nov 1901, *H.N. Ridley 13813* (BM, K, SING); Telom, Nov 1908, *H.N. Ridley 13812* (BM, K, SING); Pulau Tioman, Juara Bay, Tawa Valley, Jun 1915, *H.M. Burkill s.n.* (SING); 7th mile Raub Road, Jul 1924, *G.A. Best SF 14128* (SING); Pulau Tioman, G.Kajang, Ayer Surin, May 1927, *M.R. Henderson SF 18443* (SING); Tembeling, Jul 1929, *M.R. Henderson SF 21782* (SING); Sungei Lemoi, Sep 1931, *Jaamat 28172* (KEP, SING); Lipis, Sungai Serambun, Oct 1931, *Osmun 27998* (KEP); Tekek to Joara, May 1974, *B.C. Stone 11984* (KLU); Genting Highlands Road, Jun 1974, *B.C. Stone & T. Hattink 12013* (KLU); Fraser's Hill, Nov 1976, *H. Keng et al. s.n.* (SINU); Fraser's Hill, Bishop's Trail, Apr 1992, *R. Kiew & S. Anthonysony 3525* (SING); Pulau Tioman, G. Kajang, *Saw L.G. et al. FRI 40117* (KEP); Pulau Tioman, 1km W of Kg Juara, track to Kg Tekek, Jul 2005, *H. Duistermaat 394* (L, SING); Maran, Jengka FR, Hutan Lipur Jebak Puyuh, Gua kap, Oct 2008, *M.A. Mohd Hairul et al. FRI 60076* (KEP). **Selangor:** Telok Reserve, Klang, Sep 1918, *H.M. Burkill SF 3135* (SING); Talik reserve, Klang, Mar 1921, *H.M. Burkill SF 7034* (SING); Hulu Langat, Sungai Lalang Forest Reserve, Mar 1930, *C.F. Symington 24057* (KEP); Kuala Lumpur, Univ. Malaya, fern plot, *Khantijah 102* (KLU); Telok *Khantijah 107* (KLU); Telok FR (nr Klang?), Nov 1971, *K. Jong 9025* (KLU); N of Kuala Lumpur, Jln Gombak km36(KL), Jun 2005, *H. Duistermaat 350* (L, SING); Kepong, FRIM, forest trail behind herbarium, Jun 2005, *H. Duistermaat 356* (L, SING); Gombak, Kanching FR, along waterfall main trail, Sep 2006, *H. Duistermaat et al. FRI 51935* (KEP, L); Gombak, Kanching FR, lower part of quartz ridge, Mar 2007, *Chew M.Y. et al. FRI 53665* (L). **Negeri Sembilan:** Gunong Angsi, near bungalows, Nov 1923, *Md.Nur SF 11645* (SING); Pasoh FR, Oct 1987, *J.V. LaFrankie 2529* (KEP); Pasoh FR, nr Simpang Pertang, Jul 1989, *A. Gentry & J.V. LaFrankie 66983* (L); Gunung Angsi, Jun 2005, *H. Duistermaat 342* (L, SING); Jelevu, Berembun FR, Jeram Toi, forest trail, Apr 2008, *Yao T.L. et al. FRI 57936* (KEP, L); Jelevu, G.Telapak Buruk, Peak nr Telekom/Celcom tower, Apr 2008, *S.N. Phoon et al. FRI 60645* (L). **Malacca:** Maingay 1713 (L); Bukit Kedongong, May 1890, *R. Derry 602* (SING); Bt. Ledondong, May 1890, *H.N. Ridley 602* (BM); Jasin, Bkt Senggeh FR, Cpt.3, Jul 2008, *Y.M. Chan FRI 64724* (KEP). **Johor:** Tanjong Kopang, 1892, *H.N. Ridley s.n.* (SING); Gunung Panti, Dec 1892, *H.N. Ridley s.n.* (SING); Kukub., 1909, *H.N. Ridley 14168* (SING); Sg.Endau near Kg.Peta, Aug 1973, *Khantijah 104* (KLU).

SINGAPORE. Bukit Timah, 1892, *H.N. Ridley s.n.* (K); Bukit Timah, nr Fern Valley, 1892, *H.N. Ridley 6433* (SING); Bukit Timah, Jun 1948, *J. Sinclair 4840* (E); SBG, rainforest, nr 'rattan-entry' at palm valley, Apr 2005, *H. Duistermaat 329* (L, SING); SBG, Liane Rd nr path to greenhouses, Aug 2005, *H. Duistermaat 395* (L, SING).

SUMATERA. **Aceh:** Ketambe, valley of Lau Alas, May 1972, *W.J.J.O. de Wilde & B.E.E. de Wilde-Dnyffes 12419* (L); Gng Leuser NP, Alas river valley, Jul 1979, *W.J.J.O. de Wilde & B.E.E. de Wilde-Dnyffes 18480* (L). **Sumatera Utara:** Sibolangit, May 1917, *J.A. Lörzing 5125* (L); Sibolangit NR, Dec 1927, *J.A. Lörzing 12746* (L); Bukit Lawang-Bohorok-Langkat, Feb 1973, *R. Soedarsono 309* (K, L). **Sumatera Barat:** Afd. Agam Brani, Jun 1918, *H.A.B. Buennemeyer 3344* (L); G.Sago, Jul 1918, *H.A.B. Buennemeyer 3649* (L); Padang, nr Ajer mantjur, Aug 1878, *O. Beccari 828* (L); Kepulauan Mentawai, Island of Siberut, Aug 1924, *C. Boden Kloss SF 14497* (SING); Sipora Isl., Sioban omgeving, Oct 1924, *Iboet 417* (SING). **Riau:** Indragiri, Sg. Gaung, Sep 1940, *E. Polak 546* (L). **Kepulauan Riau:** Anambas/Natoena, Boengoeran eiland, Apr 1928, *C.G.G.J. van Steenis 1397* (L). **Jambi:** Pesisip river, nr Dusun Pasirmayang, Dec 1980, *N.A.P. Franken & M. Roos 363* (L). **Bangka-Belitung:** Bangka Island, Soengai Selan, Nov 1917, *H.A.B. Buennemeyer 2106* (L). **Lampung:** Gunung Sugi, Jan 1908, *J. Elbert s.n.* (L); Kalianidoea, Dec 1921, *C.J.M. Sloet 435* (L); Mt. Tanggamus, Apr 1968, *M. Jacobs 8117* (KEP, L, SING).

JAVA. *C.L. Blume 2047* (L). **Jawa Barat:** Bogor, *C.L. Blume s.n.* (L); Preanger, nr Gadongang (Bandong), *H. Zollinger 540, p.p.* (E, L); Priangan, Tjampaka near Tjidadap, Dec 1937, *P. Bnwaldo 3436* (L); road Pelabuhan Ratu-Kiara-Lengkong., Sep 1985, *E.F. de Vogel 7649* (L). **PHILIPPINES. Palawan:** Brooke's Point, Addison Peak, S slope, Jan 1991, *D.D. Soejarto & O. Fernando 7356* (L); Munic. Brooke's Point, S range of Mantlingajan Rang, Jun 1994, *D.D. Soejarto et al. 8330* (L); Mt. Cleopatra Ranges, Co. Calabayog, Puerto Princesa, Jun 1996, *E. Reynoso & R. Majaducon PPI 24356* (L); Irawan forest, Puerto Princesa, Aug 1996, *E. Romero et al. PPI 38462* (L).

BORNEO. **Brunei:** Belait, Labi, Kampong Tenajor, Sep 1988, *A. Mohd. Haslmi 17* (KEP, L, SING); Tutong District, track from Panchong to Benutang, Oct 1989, *L.L. Forman & J.B.J. Blewett 983* (L, SING); Belait District, Labi, path to Rampayoh waterfall, Oct 1989, *L.L. Forman & J.B.J. Blewett 1046* (L, SING); Belait, Labi, Rampayoh, Jul 1993, *J. Cowley 101* (L) & *11* (L); Temburong, Amo, Apan, Sungai Baki, Jul 1993, *J. Cowley 87* (K). **Sabah:** West Coast: Mount Kinabalu, Penibukan, Jan 1933, *J. & M.S. Clemens 30889* (BM); Kota Belud, above Sg. Dahobang S-side nr Kinabalu Park, Sep 1965, *A. Kanis 51478* (L, SAN); Ranau, Sungai Nabutan, Mar 1982, *Aban Gibot SAN 94552* (L, SAN); Kota Belud, NW side Mt Kinabalu, May 1984, *J.H. Beaman et al. 9754* (L); just outside Kinabalu Park along rd to Marai-Parai, Sep 1993, *J. Nais et al. SP 5321* (KEP); Ranau, Kampung Bundu Tuhan, Lugas, Kg. Himba, Sep 1993, *Doinis Soibeh 423* (SAN); Ranau, Kampong Takutan, Apr 1995, *T. Lommdin 221* (KEP); Ranau District, Kampung Takutan, 5km dari kpg, Jun 1995, *T. Lommdin 378* (KEP); Kota Belud, Kinabalu P. Sayap, Lumangis trail, Jun 2000, *A.D. Ponsen et al. 1619* (SAN); Interior: Tenom, Oct 1961, *A. Bmtar SAN 27364* (L); Keningau, Keningau, Ulu sg. Matud, Jun 1987, *K. Fidilis SAN 119541* (SAN); Keningau, Nabawan, via Tenom, Feb 1989, *Tay E.P. et al. 89-0409* (SING); Tambunan, Sunsuron Km 54 Jln Tambunan/Penampang, Aug 1989, *K. Fidilis SAN 127872* (SAN); Sipitang, Melakis FR, Oct 1989, *S. Awang Amin S 114838* (K, KEP, L); Sandakan: Lahad Datu, Timbun Mata Is. F.R., Aug 1940, *H.G. Keith 34* (SING) & *55500* (KEP); Lahad Datu, S. Pangaruanan, K. Bay, Dec 1959, *D. Brand 20061* (L, SING); Labuk Sugut, Beluran, Sg. Baba, Mar 1980, *Aban Gibot SAN 90037* (L, SAN); Sepilok FR, Jun 1981, *T. Sato & S. Dewol SAN 93160* (SAN); Kinabatangan, Keruak FR, Feb 1985, *K. Amin et al. SAN 108160* (SAN); Lahad Datu, Ulu Sg. Segama, Dec 1985, *G.C.G. Argent et al. SAN 108225*

(E, SAN); Lahad Datu, N-trail Danum Valley, Jul 1986, *Lee et al. SAN 109039* (SAN); Lahad Datu, Danum Valley, Mar 1987, *K. Amin & R. Joseph SAN 110020* (L, SAN); Sepilok FR, May 1987, *Jurimin Ebin SAN 116477* (SAN); Lahad Datu, Kunak, km 79 Tawau/Lahad Datu road, Jun 1987, *E. Suali & Muhamad SAN 117141* (SAN); Lahad Datu, Danum Valley FC, Begonia Cliff, Feb 1992, *E.J.F. Campbell-Gasis 234* (E, SAN); Kinabatangan District, Bukit Garam, mile 5, Nov 1994, *Reza Azmi 68* (SAN); Lahad Datu district, Madai-BaturongFR, Madai Hill, Jun 1996, *S.P. Lim et al. 656* (SAN); Kinabatangan D, Sukau, PangifR, Temangong Besar Hi, Sep 1996, *S.P. Lim et al. 1266* (SAN); Lahad Datu, Tempadong, Borneo Marble Quarry, Aug 1999, *R. Kiew 4793* (KEP); Lahad Datu District, Tabin Wildlife Res. near headquarter, Mar 2000, *K.H. Kjeldsen 94* (SAN); Lahad Datu, Madai Baturong, Jul 2000, *S. Dewol SAN 133042* (KEP, SING); Tawau: Elphinstone prov., 1922–23, *A.D.E. Elmer 20864* (L); Luasong Centre old logging area, Ikea plant, Jul 2001, *M. Postar et al. SAN 144083* (KEP, L, SAN); Tawau Hills NP, path to Bombalai, May 2005, *J.J. Vermeulen in H. Duistermaat 358* (L, SING). **Sarawak:** Kuching: Matang, Mar 1955, *W.M.A. Brooke 9756* (BM, L); Lundu, Gunong Gading, Sep 1955, *J.W. Purseglove & Md. Shah 4522* (K, L, SING); Lundu, Gunong Pueh, Sep 1955, *J.W. Purseglove 4816* (L, SING); Lundu, G.Gading, Sep 1974, *James et al. S 35087* (L); Kuching, Bau, Gg. Meraja, May 2002, *S.B. Raymond et al. 3134* (SING); Samarahan: Serian, Bukit Rawang, Tebakang area, Apr 1983, *Dyg. Awa & I. Paie S 45586B* (L); Serian, Bukit Majung, Tebakang, Dec 1998, *P. Kessler 221* (L); Sri Aman: Simanggang, Oct 1955, *W. Brooke 10730* (BM, L, SING); Ulu Sungai Silantek Kiri, Aug 1980, *I. Paie S 42477* (KEP, L); Betong: up Layar river, Grajih, Mar 1954, *W.M.A. Brooke 8241* (BM, L); Bintulu: Tatau, Bukit Naong, Apr 1995, *J. Lai et al. S 71032* (cf; KEP); Ulu Sg. Kakus, Bkt Sarang, Batu Anyi, Jan 2005, *S. Lee S 94752* (KEP); Tatau, Ulu Merirai, Gua Naga, Jul 2005, *S. Julia S 95712* (KEP, SING); Tatau, Bukit Sarang group, Bukit Anyi SE-side, Aug 2005, *J.J. Vermeulen in H. Duistermaat 400* (L, SING); Miri: Baram district, E...River, Mar 1894, *C. Hose 370* (BM); Bukit Subis area, Aug 1963, *H.P. Fuchs 21281* (L); S slopes of Gg. Subis, nr Sekaloh river, Nov 1966, *Somny Tan & E. Wright S 27258* (L, SING); Bakam, Oct 1983, *A.P. Abang Mohitar S 47201* (KEP, L); Marudi, Mulu National Park, May 1985, *A.P. Abang Mohitar & I. Othman S 49692* (KEP); Limbang: Tg. Long Amok, Sg. Ensungei, Sep 1960, *R. George et al. S 42352* (L); Kapit: Teneong, Sep 1954, *W.M.A. Brooke 9121* (BM, L). **Kalimantan W:** Landak, Ngabang, 1851, *J.E. Teyssmann 11551* (BO); ridge SW of G. Bentuang Jul 1989, *J.S. Burley et al. 3340* (L); Gn Palung NP Oct 1996, *T.G. Laman et al. 97* (E, L). **Kalimantan C:** Kahayan, Mar 1988, *J.S. Burley et al. 472* (KEP, L, SING). **Kalimantan SE:** *P.W. Korthals s.n.* (L); Tanahboemboe, G. Mangis, N v Batoelitin, Oct 1928, *D.F. van Slooten 2184* (L); km 14 Bandjermasin-Martapoera, Oct 1939, *B. Polak 503* (L). **Kalimantan E:** Boelongan, 1914, *L. Rutten 112* (U); *A. Kostermans 5418* (L); E. Kutei, G. Tepian Lobang, Jun 1951, Loa Djanan, W of Samarinda, Apr 1952, *A. Kostermans 6415* (L); Balikpapan distr. Mentawir region, Jul 1954, *A. Kostermans 9708* (L); Kutei Reserve N. of Samarinda, Mentoko, May 1970, *Soegeng Reksodihardjo 11* (L); Teluk Sanggan, W of Malinau, Jul 1981, *K. Iwatsuki et al. B 7213* (L); Wartono Kadri, km 3.5 along Samboja-Semai Rd, Mar 2005, *C. Bernard 3* (L); Meratus, Mului, Nov 2005, *N. Raes et al. 698* (L). **SULAWESI. Central:** Lore Lindu NP, Feb 2008, *D. Cicurra 483* (L).

15. *Amischotolype mollissima* (Blume) Hassk. (Fig. 10D)

Amischotolype mollissima (Blume) Hassk., Flora 46 (1863) 392. — *Campelia mollissima* Blume, Enum. Pl. Javae (1827) 7; Kunth, Enum. Pl. 4 (1843) 109; Moritz,

Syst. Verz. (1845–46) 93; Zollinger, Syst. Verz. (1854) 65; Miquel, Fl. Ned. Ind. 3 (1855) 546; Fl. Ned. Ind., Eerste Bijv. (1860) 609. — *Forrestia mollis* Hassk., Flora 47 (1864) 628, *nom. illeg.* (see note 1); Commelin. Ind. (1870) 84; Clarke in A.Candolle & C.Candolle, Monogr. Phan. 3 (1881) 236, *p.p.*; Hooker f., Fl. Brit. India 6 (1894) 383, *p.p.* — *Forrestia mollis* Hassk. var. *blumeana* Hassk., Flora 47 (1864) 628; Commelin. Ind. (1870) 84. — *Forrestia mollissima* (Blume) Koord., Excursionsfl. Java 1 (1911) 282. — *Forrestia hispida* A.Rich. var. *mollis* (Hassk.) Hallier f., Nova Guinea 8 (1913) 906; Beih. Bot. Centralbl. 34 (1916) 47. — *Forrestia mollissima* Koord. forma *typica*, Backer, Handb. Fl. Java I. 3 (1924) 33. — *Forrestia mollissima* (Blume) Koord. forma *mollissima* Backer & Bakhf., Fl. Java 3 (1968) 15. LECTOTYPE (designated here): *Blume s.n.*, Java (L. barcode L 0041655). Other syntypes: *Blume s.n.*, in sylvia montosis Javae insulae (L: 3 sheets); *Reinwardt s.n.*, Tjampea (L).

Forrestia mollis Hassk. var. *korthalsii* Hassk., Flora 47 (1864) 628; Commelin. Ind. (1870) 86. TYPE: *Korthals s.n.*, Java (L).

Forrestia mollis Hassk. var. *teysmannii* Hassk., Flora 47 (1864) 628; Commelin. Ind. (1870) 86. TYPE: *Teysmann s.n.*, Sumatera, Lubu alang (BO).

Forrestia bicolor Hallier f., Bull. Herb. Boissier 6 (1898) 360, t. XI. SYNTYPES: *Burck s.n.*, *s.d.* 'Sumatra' (BO, *n.v.*), *Jaheri s.n.*, 1895 'Deli, Tandjung Gunung' (BO?, *n.v.*).

Stem rhizome absent. erect part 100–160 cm long. basally sometimes with some stilt roots, simple; internodes glabrous or rarely moderately 0.2 mm long hairy. **Sheath** 10–19 mm diam., glabrous or with one to few lines of (0.5–)3–4.5 mm long, white to yellow or brownish hairs, mouth ciliate. **Leaf blade** 27–44 × 5.7–10.6 cm. 3.4–5.9 times as long as wide, base very gradually to abruptly narrowed into an indistinct winged pseudopetiole to 4 cm long and 1.5–2 mm wide; lower surface moderately to densely (0.1–)0.5–1 mm long colourless- to white-hairy or rarely glabrous, upper surface glabrous (rarely with 0.2 mm long hairs near margin); submarginal hairs on upper surface, (0.5–)1–1.5 mm long, dense, yellow. **Inflorescence** on erect stem. sessile, 3.2–5.7 cm diam., dense with branches obscure, 20–many-flowered. **Pedicel** 2–3 mm long. **Sepals** (8.5–)12–15.5 × 2.5–4.5 mm, probably slightly elongating in fruit, light violet. lilac or red, sparsely 0.5–1.5 mm long ciliate margins and keel or rarely glabrous, tip hooded. **Petals** 9–10 × 3 mm, c. as long as sepals, colour unknown. glabrous, margin minutely fringed at apex. **Stamens** filament 8–10 mm long. colour unknown, upper 2 mm with many 3 mm long hairs; anthers 1–1.3 × 0.6–0.7 mm. colour unknown, thecae opening by a longitudinal slit. **Capsule** 6–10 × 4.5–6 mm, obovoid, shorter than sepals by 3–6 mm, whitish or dark carmine, apex to upper half 0.2–1 mm long hairy; valves free to fused for 1/3 of length; apex depressed, lobes 0.5–1.3 mm long; style remnant 0.5–1.2 × 0.3 mm. finally deciduous or persistent. **Seeds** 2 per locule, aril orange.

Distribution. Sumatera (Aceh, Sumatera Utara, Sumatera Barat), Java (W: Bogor, Preanger, Tjisaroea; C: Banjoemas; E: Besuki).

Ecology. Primary and secondary (riverine) rain forest, along stream, in gorge, on roadside, on alluvial, fertile soil. Altitude: 60–600(–1420) m asl.

Notes. 1. Hasskarl (1864), when he transferred species of *Amischotolype* to *Forrestia*, choose for *A. mollissima* the illegitimate name *F. mollis* (illegal because an autonym is required in the absence of a preoccupied earlier homonym in the recipient genus), based on *Tradescantia mollis* Reinw. in sched., with *Campeelia mollissima* Blume appearing in the synonymy. Clarke (1881) and Hooker (1894) included in their concept specimens of *A. gracilis*, *A. hirsuta* and *A. barbarossa*, these only later recognised as distinct separate species. Ridley (1907, 1924: sub *F. mollis*) and Turner (1997: sub *A. mollissima*) used the name for *A. barbarossa* exclusively.

2. The species is limited in its distribution to Java and Sumatera. In Java it is not known above 600 m asl, whereas in Sumatera it occurs up to 1420 m asl. Beaman & Beaman (1998) cited *A. mollissima* for Borneo (*Daim Andau* 566), but this collection is *A. hirsuta*.

3. *A. mollissima* is very similar to *A. hispida* in size and shape of the leaf blade, inflorescence and flowers. However, *A. hispida* differs in having long rhizomes, capsules without apical lobes and with valves fused for 1/4 to 1/2 of the length. The two species are geographically disjunct: *A. hispida* ranges from Borneo and the Philippines eastward to New Guinea.

4. I have not seen the type of *Forrestia bicolor* (it is unclear if Jaheri's collection in the Hortus Bogoriense ended as a collection in any herbarium). Nevertheless, there can be no doubt that this is a synonym for *A. mollissima*, because the combination in the description of sepals 13–15 mm long, inflorescence opposite the leaves (leaves thus present), and the capsule apex distinctly depressed (“...apice umbilico profundo triquetro praedita...”) is unique for this species.

5. The only other species that have apical lobes on the capsule are *A. barbarossa* (absent to 0.3 mm long; see there, note 1), *A. welzeniana* (0.5 mm long; sheath, sepals and capsule glabrous) and *A. lobata* (1–1.5 mm long; distinctly pseudopetiolate leaf blades, and capsules exceeding the calyx and bristly-hairy).

Specimens examined: SUMATERA. *P.W. Korthals s.n.* (L). **Aceh:** Ketambe, valley of Lau Alas, May 1972, *W.J.J.O. de Wilde & B.E.E. de Wilde-Dnyffes* 12036 (L); Gn Leuser NR, Ketambe, valley of Lau Alas, May 1974, *H.D. Rijkssen* 050574 (L); Gng Leuser NR, c. 5 km S of Ketambe, Alas riv, Jun 1979, *W.J.J.O. de Wilde & B.E.E. de Wilde-Dnyffes* 18035(A) (L); foot of Mt Biak Mentelang Koacane, Feb 1980, *Afandi Ma'Roef* 371 (L); Kloet NR, along Krung (=river) Lembang, Jul 1985, *W.J.J.O. de Wilde & B.E.E. de Wilde-Dnyffes* 19908 (L). **Sumatera Utara:** Karohoogvlakte bij Lingga, Jan 1919, *J.A. Lörzing* 6272 (L); Gajo, 1921, *G.C.E. van Daalen* 367 (L); Sebolangit, Bukit Senia., Aug 1921, *Md.Nur SF* 7365 (K, SING); Sibolangit NR, Dec 1927, *J.A. Lörzing* 12747 (L); Biang valley nr Sarinembah, Karo plat nr Lingga, Oct 1928, *J.A. Lörzing* 14432 (L); Kaban Djahe, May 1939, *A.H. Batten Pool* s.n. (SING). **Sumatera Barat:** Lubu Abang, *J.E. Teysmann s.n.* (BO); above Telug Kabung, Jun

1953, *J. van Borssum Waalkes 1507* (K, L).

JAVA. *C.L. Blume s.n.* (L); *P.W. Korthals s.n.* (L); *C.G.C. Reinwardt s.n.* (L); *J.C. van Hasselt s.n.* (L); *J.C. Ploem s.n.* (L); *Mumutean s.n.* (L). **Jawa Barat:** Salak *C.L. Blume 2249* (L); Vogelberg, Tjampea, *J.C. van Hasselt s.n.* (L); nr Bogor, foot of mnt Salak, 1821, *C.L. Blume s.n.* (L); Tjisaroëa, Oct 1870, *R.H.C.C. Scheffer s.n.* (L); Buitenzorg, Bandungan, Apr 1900, *Soegandiredja 198* (L); G.Karang bij Klappa-Noenggal. NO van Buitenzorg. Dec 1912, *Backer 5968* (L); Bogor, Preanger, Tjisaroëa: Preanger, Tjibadak o/d Halimoen, Jan 1920, *R.C. Bakhuizen van den Brink Sr. 3150* (L); Br. Tjiomas, Aug 1922, *R.C. Bakhuizen van den Brink Sr. 1678* (U); Preanger: Z van Radjamandala, May 1924, *C.A. Wisse 1089* (L); boschweg van Tjipannas naar Wijnkoopsbaai, Jun 1932, *A. Kloos 371* (L); Bogor, Tjiburial, Feb 1951, *Nedi & Idjan 398* (K, L). **Jawah Tengah:** Banjoemas, Pasir Salam bij Madjenang, Jan 1915, *C.A. Backer 18755* (L); **Jawa Timur:** Besuki, Tjoeraman, *S.H. Koorders 20664b* (L).

16. *Amischotolype monosperma* (C.B.Clarke) I.M.Turner (Fig. 10E, 17A–C & 18)

Amischotolype monosperma (C.B.Clarke) I.M.Turner, Novon 6 (1996) 221; Gard. Bull. Sing. 47 (1997) 516. — *Forrestia monosperma* C.B.Clarke in Hallier f., Bull. Herb. Boissier 6 (1898) 359; Ridley, Mat. Fl. Malay. Penins. 2 (1907) 124; Fl. Malay. Penins. 4 (1924) 360. LECTOTYPE (designated here, see note 1): *Curtis s.n.*, 1890, Waterloo Estate, Perak; ‘this specimen flowered in the Botanic Garden of Penang’ (SING).

Amischotolype irritans auct., sensu Beaman & Beaman, The Plants of Mount Kinabalu 3 (1998) 109, *non* Ridley.

Forrestia marginata auct., sensu Hasskarl, Flora 47 (1864) 630, *p.p.*; Commelin. Ind. (1870) 90, *p.p.*; Hooker f., Fl. Br. India 6 (1894) 383, *p.p.*

Tradescantia sp., Griffith, Not. Pl. Asiat. 3 (1851) 235.

non Forrestia monosperma auct., sensu Cherfils in Lecomte, Fl. Gen. Indo-Chine 6 (1937) 855. — *Amischotolype mollissima* (Blume) Hassk. var. *monosperma* (C.B.Clarke) P.H.Hô, Càyco Vietnam 3, 1 (1993) 478, illus. (‘Amischolotype’), *nom. inval.*, no basionym. (see note 3, and note 2 under *Amischotolype*).

Stem ascending from creeping and branched, c. 70 cm long rhizome; erect part c. 60 cm long, simple; internodes sparsely to densely 0.1–0.5 mm long red- to redbrown-hairy. **Sheath** (7–)12–30 mm diam., reddish green, many (rarely only at front or in lower half) dense lines of 2.5–4 mm long, orange to orange-brown or red hairs, in between glabrous to sparsely 0.1 mm long hairy, mouth glabrous to ciliate. **Leaf blade** (21–)30–50(–68) × (6.5–)9–16 cm, 2.3–5.1 times as long as wide, bullate, lower surface usually red to purple, base gradually to rather abruptly narrowed into a winged pseudopetiole up to 13 cm long and 3–7 mm wide; both surfaces glabrous or rarely sparsely 0.1 mm long hairy; submarginal hairs on upper surface, 0.2–0.7 mm long,

rather sparse, colourless or yellow-brown. **Inflorescence** on rhizome and around knee, peduncle (0–)3–20 mm long, (2.5–)3.5–9 cm diam., dense to very lax with branches obscure or longest 0.5–4.5 cm long, 20–many-flowered. **Pedice**l absent. **Sepals** (8–)9–14(–18) $\times$ 2–4.5 mm, not elongating in fruit, red or reddish brown to purple (in flower and fruit), rarely creamy yellow at upper half, margins and keel sparsely to rather densely (0.5–)1–2 mm long orange- to redbrown-hairy, in between glabrous or 0.3–0.5 mm long hairy, tip hooded. **Petals** 8–9.5 $\times$ 2.5–3 mm, slightly shorter than sepals, white, glabrous, margin at apex minutely fringed. **Stamens** with filaments 9–12.5 mm long, white, in upper 2–3 mm with 3.5–4 mm long hairs; anthers 1–1.5 $\times$ 0.9–1 mm, white, thecae opening by a longitudinal slit. **Capsule** 7.5–8.5 $\times$ 3.5–4 mm, obovoid, shorter than sepals by 1.5–5(–8) mm, magenta red or purple, apex to upper half sparsely to densely 1–2 mm long orange- to red-brown-hairy; valves unknown; apex depressed, lobes absent; style remnant 0.7 $\times$ 0.3 mm, deciduous. **Seeds** 2 per locule, 1 rarely abortive, aril orange.

Distribution. Myanmar (*u.v.*, see note 2), Thailand (Peninsular Thailand: Yala), Peninsular Malaysia (Kedah, Kelantan, Terengganu, Perak, Pahang, Selangor, Negeri Sembilan), Borneo (Sabah: West Coast, Interior).

Ecology. Primary forest or forest margin, often on stream or river banks, often in wet areas and on limestone. Altitude: 30–1000(–1500) m asl.

Notes. 1. The species required lectotypification (see Turner 1996). The original description mentioned the following locality (Clarke in Hallier 1898): “*Aus Perak in den botan. Garten zu Pinang und von hier in die Gärten zu Singapur, Buitenzorg u. s. w. eingeführt.*” This is very similar to the annotation on the label of Curtis *s.n.*, 1890, Waterloo Estate, Perak (SING), which is therefore selected here as the lectotype.

2. The authors who mentioned *Tradescantia* sp. of Griffith (1851a), including Hasskarl (1864), Hooker (1894), and Ridley (1907), placed it in *A. marginata*. Unfortunately, I did not see Griffith’s material (Merg. Herb. 185, August 1834, in sylvis Kyouklag), collected in the Mergui Archipelago, Myanmar. Griffith (1851b) provides no illustration of any Commelinaceae species. However, Griffith’s (1851a) description (‘*infra florifero foliorumque vaginarum reliquis obtectis*’—flowering on the part covered with remnants of leaf sheaths, and ‘*sepalis rubro-aurantiaceis dorso pilosa*’—sepals with red-golden hairs on the back) can only refer to *A. monosperma*. It is the only known record for Myanmar.

3. Although the species has been reported for Lao P.D.R. and Vietnam (Cherfils 1937; Ho 1993, Fig. 8427), I doubt its presence there. I have not seen material from Lao P.D.R. or Vietnam referable to *A. monosperma*. Material determined by Cherfils as *F. monosperma* is *A. divaricata* (Harmand 1920, Pierre *s.n.*, and Poilane 186, all P). Further, the description by Cherfils (1937) cannot refer to *A. monosperma*: the leaf blades are too narrow, the sheaths have white appressed short hairs, and the sepals are sparsely hairy near the apex only. Lastly, the illustration in Ho (1993) shows a plant flowering at the erect stem with leaf blades present, and capsules that are much

longer than the sepals. Both the description of Cherfils (1937) and the illustration in Ho (1993) could refer to *A. divaricata*.

4. In Peninsular Malaysia normally found at low altitudes, only once (in Perak) at 960 m asl.; in Thailand found only once, and probably in mountainous area. In Borneo, on the other hand, only found at around 1000 up to 1500 m alt.

Specimens examined: THAILAND. **Peninsular Thailand:** Yala, waterfall, Oct 1970, *Ch. Charoenphol et al.* 4129 (KLU, L, P. SING).

PENINSULAR MALAYSIA. **Kedah:** Langkawi, Jan 1991, *Khairuddin Hj. Itam* 9 (KEP). **Kelantan:** Gua Batu Goh, 0.5 mile S of Gua Musang, *T.C. Whitmore FRI 4043* (KEP, L); Gua Panjang, Ulu Kelantan, Aug 1962, *UNESCO 534* (SING); Gua Ninik, Gua Musang, May 1990, *R. Kiew & S. Anthonyamy* 2963 (SING); Gua Musang, Gua Batu Boh, Mar 2008, *Chew M.Y. et al. FRI 60153* (KEP). **Terengganu:** Ulu Brang, Jul 1937, *L. Moysey & Kiah SF 33855* (SING); Hulu Terengganu, Petuang FR, Jul 2006, *S.N. Phoon & R. Kiew FRI 51981* (KEP). **Perak:** Waterloo Coffee Estate, 18xx, *C. Curtis s.n.* (SING); Waterloo Perak, May 1890, *C. Curtis s.n.* (SING); Cenderiang, 1961, *M.P.M. Castle-Smith 30* (K); Tapah Hills, Along Sg. Who, Jul 1966, *F.S.P. Ng FRI 1350* (KEP, SING); Belum, nr Sungei Remai, Apr 1994, *I.M. Turner 94-49* (SINU). **Pahang:** Tahan River, 1891, *H.N. Ridley s.n.* (K, SING); Tembeling, Jul 1929, *M.R. Henderson SF 21796* (SING); at Gap of Fraser's Hill Rd., Jul 1960, *M.E.D. Poore 230* (K, KLU); Gua Musang, Ulu Kelantan, Aug 1962, *UNESCO 428* (SING); Ulu Sg. Sat near Kuala Kelepah, Jul 1970, *Md.Shah & Md.Noor 1883* (KEP); Taman Negara, nr Kuala Tahan, Gua Rimau limes outcrop, Aug 1971, *Chin S.C. 1275A* (KLU); Taman Negara, path from Kuala Tahan to Batu Linga, Aug 1972, *B.C. Stone 10860* (KLU); base of Bt.Terseh, Taman Negara, Aug 1973, *B.C. Stone 11582* (KLU); Batu Luas, Taman Negara, Oct 1984, *R. Kiew 1352* (KEP, SING); Kampong Woh, *A. Vogel 960236* (L); Jerantut, Taman Negara, Camp Melantai, May 2008, *Chew M.Y. et al. FRI 60260* (L). **Selangor:** Gua Batu, Apr 1889, *H.N. Ridley 4599* (K, SING); Ulu Gombak, Oct 1937, *Md.Nur SF 34206* (L, SING); Gombak, Oct 1979, *S. Anthony SA 262* (KEP); Gombak Valley, stream to waterfall, Oct 1981, *R. Kiew 1096* (SING); Kuala Lumpur, Rimba Ilmu Garden (KLU), May 2005, *H. Duistermaat 341* (L, SING); N. of Kuala Lumpur, Jln Gombak km 36 (KL), Jun 2005, *H. Duistermaat 349* (L, SING). **Negeri Sembilan:** Pasoh FR, Oct 1987, *J.V. LaFrankie 2528* (KEP).

BORNEO. **Sabah:** West Coast: Kota Belud, Mount Kinabalu, Dallas El., 1931-32, *J. & M.S. Clemens 26141* (BM, K, L); Kota Belud, Mount Kinabalu, Penibukan, Kinitaki R, Jun 1933, *Clemens 50405* (BM); Interior: Tambunan, Tontolob Liwan, Oct 1989, *Soinin et al. SAN 124990* (KEP); Tambunan, Crocker Range NP, Oct 1999, *A.D. Poulsen et al. 1514* (KEP); Tambunan, Trusmadi, Loloposon (Gua), Jul 2005, *J.J. Vermeulen in H. Duistermaat 397* (L, SING).

17. *Amischatolype parvifructa* Duist. sp. nov. (Fig. 5 & 13D)

Amischatolype divaricatae similis in foliis supra pilis submarginalibus brevibus capsulis calyce superantibus, sed vaginis pilis 0.1–0.2 longis, capsulis 7–9 mm longis albis ad roseis pilis 0.5–1 mm longis satis mollis differt. TYPUS: *Chew W.L.* 837, October 1963, Peninsular Malaysia, Pahang, Cameron Highlands, Bukit Ruil, 1800 m a.s.l. (holo SING; iso L).

Stem ascending from a rhizome up to c. 60 cm long; erect part 90–150 cm long and scrambling or not, simple, at base with few stilt roots; internodes moderately 0.1–

0.3 mm long hairy. **Sheath** 8–10 mm diam., moderately to densely 0.1–0.2 mm long hairy, mouth ciliate. **Leaf blade** 18–31.5 × 5.5–8.0 cm, 3–4.4 times as long as wide, smooth, base rather abruptly narrowed into 3–4 cm long and 1–2 mm wide winged pseudopetiole; both surfaces glabrous or moderately 0.1 mm long hairy; submarginal hairs on upper surface, 0.2–0.4 mm long, (rather) sparse, white. **Inflorescence** on erect stem, sessile, 2–2.7 cm diam., dense with branches obscure, 10–15-flowered. **Pedicel** 0–0.5 mm long. **Sepals** 7.3–8.5 × 3–3.5 mm, not elongating in fruit, green or whitish turning purplish, sparsely to rather densely 0.3–0.6 mm long hairy especially in upper half, tip hooded. **Petals** c. 7 × 2 mm, slightly shorter than sepals, pale green on outer surface, white on inner surface, glabrous, margin entire. **Stamens** with filaments hairy, anthers white, otherwise unknown. **Capsule** 7–9 × 4.5–6 mm, obovoid, longer than sepals by 3–5 mm, white to pink, moderately to rather densely 0.5–1 mm long hairy; valves fused for 1/4 of length or finally free; apex distinctly depressed, lobes absent; style remnant 0.5–1.5 × 0.2–0.4 mm, persistent. **Seeds** 2 per locule, aril colour unknown.

Distribution. Peninsular Malaysia (Pahang; Cameron Highlands).

Ecology. Hill or (lower) montane forest. Altitude: 1350–1980 m asl.

Notes. The epithet refers to the rather small fruits compared to *A. divaricata* with which it could be confused because of the sometimes scrambling habit, the short submarginal hairs on the upper surface of the leaf blade and the capsule exceeding the calyx. Differences between them are mentioned in the key (lead 23). Also, the distribution is disjunct: *A. divaricata* has been collected from Myanmar, Cambodia, Lao P.D.R., Thailand and Sumatera whereas the present species is endemic to Cameron Highlands in Peninsular Malaysia.

Specimens examined: PENINSULAR MALAYSIA. **Pahang:** Ulu Telom, Aug 1931, *Jaamat* 27271 (KEP); Cameron Highlands: below Robinsons Falls, Oct 1961, *H.M. Burkill* 2852 (SING); Bukit Ruil, Oct 1963, *Chew W.L.* 837 (L, SING), Aug 1975, *Rao et al. s.n.* (SINU); path no 4 (nr Tanah Rata?), Apr 1980, *S. Anthony SA* 305 (KEP); Tanah Rata, Robinson waterfall, Sep 1985, *A. Latiff et al.* 867 (L), Mar 2010, *R. Kiew et al. FRI* 70474 (KEP).

18. *Anischotolype pedicellata* Duist. **sp. nov.** (Fig. 6)

Anischotolype hispida arte similis, capsulis calyce superantibus, pilis longioribus setosioribus, capsulae valvis fere ad basin liberis differt. TYPUS: *Hallier B2600*, March 1894, Indonesia, S. Kalimantan, S of Banjarmasin, Liang Gagang (holo L).

Forrestia hispida A.Rich. var. *typica* auct., sensu Hallier f., Beih. Bot. Centralbl. 34 (1916) 46, p.p. (see note); non Hallier f. (= *A. hispida*).

Forrestia hispida auct., sensu Merrill, J. Straits Branch Roy. Asiat. Soc. (1921) 113, p.p. (see note); non A. Rich. (= *A. hispida*).



Fig. 5. *Amischotolype parvifructa* Duist. **A.** Habit. **B.** Fruit with persistent sepals. Drawing by A. Walsmit Sachs, from *Chew W.L.* 837 (L).

Stem ascending from short to more than 20 cm long rhizome; erect part 70–200 cm long, simple; internodes glabrous or very sparsely to moderately 0.2–0.3 mm long hairy. **Sheath** 9–15 mm diam., with several lines of 3–4 mm long, yellow or brown hairs, mouth ciliate. **Leaf blade** 29–47 × 5–9.1 cm, 4.3–6.2 times as long as wide, base gradually to rather abruptly narrowed into indistinct to 5 cm long and 2–3 mm wide winged pseudopetiole; both surfaces glabrous or sparsely 0.2 mm long hairy; submarginal hairs on upper surface, 1.5–2.5 mm long, dense, yellow. **Inflorescence** on erect stem, sessile, 2–4 cm diam., dense with branches obscure to 3 mm long, 20–30-flowered. **Pedicel** 2–5 mm long. **Sepals** 8.5–9.5 × 2.5–4 mm, not elongating in fruit, pink to purple or magenta, glabrous or (very) sparsely 0.2–1.5 mm long ciliate keel, tip hooded. **Petals** c. 8 × 2 mm, white or yellow (in bud), glabrous, margin entire. **Stamens** filament c. 7 mm long, colour unknown, upper 1 mm with 0.5–1.5 mm long hairs; anthers 0.9–1 × 0.4–0.5 mm, colour unknown, thecae opening by a longitudinal slit. **Capsule** 7–8.5(–10) × 4–6 mm, ovoid, equalling or exceeding sepals by up to 1.5 mm, bright lilac to purple, at least at apex rather sparsely to moderately 1–2.5 mm long bristle-hairy, hairs yellow to brown; valves almost free; apex depressed, lobes absent; style remnant 0.7–1 × 0.3–0.5 mm long, persistent. **Seeds** 2 per locule, aril orange.

Distribution. Borneo (Sabah: West Coast, see note; Sarawak: Limbang; Kalimantan: W, C, S).

Ecology. Primary or newly disturbed mixed dipterocarp rain forest, hill forest, streambanks, on (red) clayey soil. Altitude: 120–150(–1500) m asl.

Notes. The name refers to the presence of a pedicel of at least 2 mm long, a character this species shares with six more species. The species most closely resembles *A. hispida*, but is different in the capsule exceeding the calyx and with longer and more bristly hairs, and with valves free almost to the base. It is endemic to Borneo, growing in lowland rain forest and only on Mount Kinabalu up to 1500 m altitude.

Specimens examined: BORNEO. **Sabah:** West Coast: Kota Belud, Mount Kinabalu, Penibukan, Feb 1933, *J. & M.S. Clemens s.n.* (BM) & 31295 (BM). **Sarawak:** Limbang, 1/2 day from Lawas, 1954–55, *W.M.A. Brooke 10227* (L). **Kalimantan W:** Kabupaten Sanggau, Feb 1994, *W. de Jong 743* (L); Serawai, Jan 1995, *A.C. Church et al. 1544* (L). **Kalimantan C:** Bukit Raya & Upper Katinabatan R., Upper Samba River, Nov 1982, *J.P. Moge & W.J.J.O. de Wilde 3681* (L); Tumbang Tubus, Jan 1983, *J.F. Veldkamp 8193* (L); Sintang, Apr 1994, *A.C. Church et al. 929* (L); Sintang HPH km70–72, SW along logging road, Apr 1994, *U.W. Mahyar et al. 929* (SING). **Kalimantan S:** S of Banjarmasin, Liang Gagang, Mar 1894, *H. Hallier B2600* (L).

19. *Amischotolype rostrata* (Hassk.) Duist. **comb. nov.** (Fig. 10F)

Forrestia rostrata Hassk., Flora 47 (1864) 631, Commel. Ind. (1870) 94; Hallier f., Beih. Bot. Centralbl. 34 (1916) 48; Merrill, J. Straits Branch Roy. Asiat. Soc. (1921) 113. —

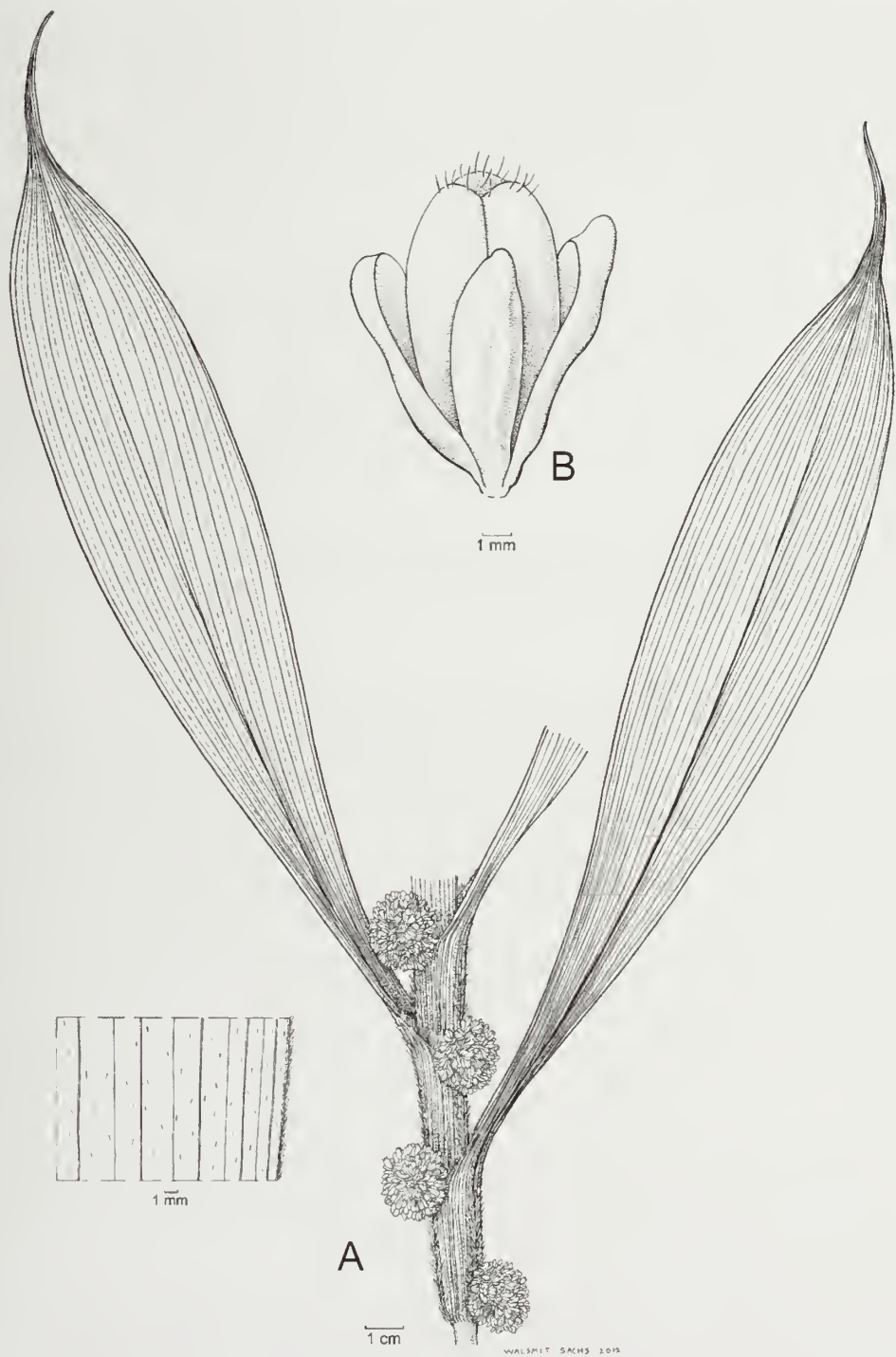


Fig. 6. *Amischotolype pedicellata* Duist. **A.** Habit. **B.** Fruit with persistent sepals. Drawing by A. Walsmit Sachs, A. from *H. Hallier B2600* (L), B. from *J.P. Moge & W.J.J.O. de Wilde 3681* (L).

Campelia glabrata auct. β *acuminatissima* Hassk. in Miquel, Pl. Jungh. (1852/53) 155. — *Campelia* sp., Zollinger, Syst. Verz. (1854) 65. — *Forrestia marginata* (Blume) Hassk. var. β *rostrata* (Hassk.) C.B. Clarke in A. Candolle & C. Candolle, Monogr. Phan. 3 (1881) 237; Hooker f., Fl. Brit. India 6 (1894) 384. LECTOTYPE (designated here): *Junghuhn s.n., s.d.*, Java, Medinie, Ungarang (L, barcode L 0928865). Other syntypes: *Blume s.n., s.d.*, Java, Preanger, near Lembang (L); *Zollinger 503* (B, *n.v.*; P in hb Franqueville, *n.v.*).

Forrestia rostrata Hassk. var. *zollingeri* Hassk., Commel. Ind. (1870) 96. SYNTYPES: *Zollinger 540 p.p.*, Java, Bantam prope Tjikoya in silvula humida (G-DC, B, *n.v.*); *Anon. s.n.* Java (L in hb Hasskarl).

Forrestia porrecta Ridl., J. Malayan Branch Roy. Asiat. Soc. 1 (1923) 102. LECTOTYPE (designated here; see note 3): *Ridley s.n.*, February 1921, Sumatera, Berastagi Hill Woods (K).

Forrestia distans Ridl., J. Bot., Suppl. 63 (1925) 124; Backer & Bakhuizen van den Brink, Fl. Java 3 (1968) 15 (see note 4). TYPE: *Forbes 612*, Java, Mt. Waringin, 5000 ft (holo BM, *n.v.*).

Stem ascending from a rhizome up to 200 cm long; erect part up to 200 cm long, scrambling, simple or branched; internodes glabrous or rarely sparsely 0.2–0.3 mm long hairy. **Sheath** 3–9 mm diam., 0.2–0.5 mm long hairy, rarely glabrous, mouth ciliate. **Leaf blade** 13–23 $\times$ 3–6 cm, 3.5–4.9 times as long as wide, base gradually to rather abruptly narrowed into an indistinct or 0.5–1 cm long and 0.5–2 mm wide winged pseudopetiole; both surfaces glabrous; submarginal hairs on lower surface or rarely absent, 0.2–0.5(–1.5) mm long, rather sparse. **Inflorescence** on erect stem, sessile, 1.3–2.8 cm diam., (rather) dense with branches obscure, 7–10-flowered. **Pedicel** absent. **Sepals** (5–)6–8.5 $\times$ 2–4.5 mm, not elongating in fruit, colour unknown, glabrous or moderately 0.2–0.7(–1) mm long colourless- to yellowish-hairy in upper half, tip slightly hooded. **Petals** 6–7 $\times$ 2–2.5 mm, as long or longer than sepals, white, glabrous, margin at apex minutely fringed. **Stamens** filament 8–10 mm long, white, in upper 1–2 mm with 2–2.5 mm long hairs; anthers 0.9–1.6 $\times$ 0.6–0.9 mm, white, thecae opening by a apical pore. **Capsule** 8.5–11 $\times$ (5.5–)7–8.5 mm, ovoid, longer than sepals by 3–7 mm, colour unknown, entirely to upper 1/3 sparsely to rather densely 0.8–1.5 mm long hairy (longest hairs at apex), hairs colourless to yellowish; valves fused for (1/4 to) 1/2 of length; apex obtuse, lobes absent; style remnant (0.3–)1(–2.5) $\times$ 0.2–0.4 mm, persistent. **Seeds** 2 per locule, aril colour unknown.

Distribution. Sumatera (Berastagi), Java (West: Priangan, Bogor, Tasikmalaya; Central: Semarang; East: Madiun, Pasuruan, Besuki), Maluku (unspecified).

Ecology. Moist secondary forest. Altitude: (200–)700–1600 m asl.

Notes. 1. This species is very similar to the genus *Porandra*, with the thecae opening by an apical pore and the scrambling habit often with branched stems (see Introduction). However, species of *Porandra* differ from *A. rostrata* in having purple anthers, *P. ramosa* has teardrop-shaped anthers, while *P. scandens* has sheaths with a line of at least 1 mm long hairs and submarginal hairs on the upper surface of the leaf blade. Species of *Porandra* are hitherto recorded only from mainland Asia, but I have identified specimens from Sumatera as *P. scandens* (Lesger 206, Lörzing 6273, van Steenis 6201). *Amischotolype rostrata*, on the other hand, is known only from the Indonesian Archipelago, mainly Java, with only two collections from Sumatera and one from Maluku. Hasskarl (1864) mentioned *A. rostrata* for the island of Pinang (Peninsular Malaysia). However, the collection he cited (Wallich 8977a) contains a specimen of *A. marginata* and a specimen that cannot be identified with certainty from microfiche (see *A. hookeri*, note). *Amischotolype rostrata* has also been mentioned for India (Griffith 5486: East Bengal, Mishmee Mountains; Clarke 1881), but this specimen is *P. ramosa*.

2. Although I have not seen the types of *F. rostrata* var. *zollingeri*, Hasskarl (1870) described it as different from the species in having more robust stems which are creeping and then ascending and branched, and larger leaves (but he also describes smaller ones that are present as well). This variation is part of a continuum that does not merit distinction at any level.

3. Ridley (1923) did not cite specimens when he described *F. porrecta*, stating only that it was found in the Berastagi hill woods (Sumatera). His description mentions the typical long creeping stems lying prostrate on the ground or creeping up the trunk of a tree, and the remarkably small heads of flowers. I have seen only one collection of Ridley (K) that fits his description and the locality. I have designated this as the lectotype of *F. porrecta*.

4. Ridley (1925) mentioned that *F. distans* is most nearly allied to *F. porrecta* which is a synonym for *A. rostrata* (see note 3), whereas Backer & Bakhuizen van den Brink (1968) thought it is identical with *F. mollissima* forma *glabrata* (= *A. glabrata*). The description of *F. distans* nicely fits that of *A. rostrata*. Therefore it is accepted as a synonym of the present species. Differences between *A. glabrata* and *A. rostrata* include the number of flowers per inflorescence, the length of the sepals (absolute, and relative to the length of the capsule), and the opening of the thecae.

Specimens examined: SUMATERA. **Sumatera Utara:** Berastagi, (1918), C.D. Ouwehand 372 (L); Berastagi Hill Woods, Feb 1921, H.N. Ridley s.n. (K, L).

JAVA. Anon. (in Hb. Hasskarl) s.n. A (L); F.W. Junghuhn s.n. (L). **Jawa Barat:** prope Lembang haud procula a Bandung, C.L. Blume s.n. (L); Tjibodas, J.G. Boerlage s.n. (L); Limbang, P.W. Korthals s.n. (L); M.Tjiseroea, Oct 1870, R.H.C.C. Scheffer s.n. (L); m.Gedeh, 1895, H. Hallier 533 / 51 (L); inter Tjibodas et Tjibeureum, 1895, H. Hallier 533 / 71 (L); Preanger, Tjibodas, 1915, Sapiin 2037A (L, U); Preanger, Tjidadap, Tjibeber, Apr 1917, R.C. Bakhuizen van den Brink Sr. 2174 (L); Preanger, Pendjaloe, Jul 1917, S.H. Koorders & A. Koorders-Schumacher 44374B (L); Tjibodas, Pantjuran emas, May 1948, D.R. Pleyte 262 (L); Dago (waterval), Feb 1949, S.M. Popta 723/71 (L); Gede, dal van de Tji Bodas, Mar 1950, S.J. van Ooststroom 13206 (L); **Jawa Tengah:** Medinie, Ungarang, n-helling, F.W. Junghuhn s.n. (L); **Jawa Timur:**

Madioen, Ngebel, May 1896, *S.H. Koorders 23266B* (K, L); Pasuruan, Tangkil, Zuidergeb., Jun 1896, *S.H. Koorders 23384B* (L) & *23887B* (L); Besuki, Pantjoer, Idjen, Aug 1897, *S.H. Koorders 28526B* (L); Tengger, 1912, *J.P. Mousset 431* (L); O.Wilis, 1914, *J.A. Lörzing 914* (L).

MALUKU. 1859–60, *G.H. de Vriese & J.E. Teijsmann s.n.* (L).

20. *Amischotolype sphagnorrhiza* Cowley (Fig. 10G)

Amischotolype sphagnorrhiza Cowley in Coode et al., Checklist Fl. Plants & Gymn. Brunei Dar. (1996) 352 ('*sphagnorrhiza*'), 434; Cowley & Furness, Kew Bull. 52 (1997) 465. TYPE: Coode et al. 7062 (holo K, photo; iso BRUN, n.v.)

Stem ascending from a rhizome 19–50 cm long; erect part 10–30 cm long, with up to 45 cm long aerial roots with *Sphagnum*-like rootlets, simple; internodes unknown. **Sheath** 8–10 mm diam., glabrous, mouth glabrous. **Leaf blade** 18–25 × 4.5–7.3 cm, 2.6–4.8 times as long as wide, smooth, lower surface pale purple or not, base gradually narrowed into indistinct pseudopetiole; both surfaces glabrous; submarginal hairs absent. **Inflorescence** at knee, peduncle 5–40 mm long, up to 7 cm long, lax with branches up to 4.5 cm long, 10–25-flowered, at base with *Sphagnum*-like roots. **Pedicel** 2–6 mm long. **Sepals** 2–10 × 1–5 mm, elongating in fruit, white to greenish-cream or pink to purple, sparsely to moderately 0.5 mm long redbrown bristly hairy, tip hooded. **Petals** 2–6 × ? mm, as long or shorter than sepals, white, glabrous, margin entire. **Stamens** with filaments 1–7 mm long, white, upper part with 0.5–1 mm long, yellow hairs; anthers 1–1.2 × 0.5 mm, yellow, thecae opening by a longitudinal slit. **Capsule** 9.5–24 × 5–10 mm, ovoid, longer than sepals by c. 8 mm, deep red-purple or purple-brown, 0.5 mm long orange-hairy; valves free; apex slightly depressed, lobes absent; style remnant absent. **Seeds** 2 per locule, aril unknown.

Distribution. Borneo (Brunei: Belait; Sarawak: Sri Aman: Sri Aman).

Ecology. Low or relatively open mixed dipterocarp forest, river valleys, on yellow sandy clay. Altitude: 15–230 m asl.

Notes. A very peculiar species, in habit resembling *Palisota* spp. from Africa. According to Cowley & Furness (1997), based on pollen and flower morphology, it is best placed in *Amischotolype*. Apart from the *Sphagnum*-like rootlets, it is very different from the other species of the genus in the very short erect part of the stem and the very lax and elongated inflorescence (although those of *A. marginata* can be quite lax and elongated as well). Future studies as to the generic placement of this species requires a molecular analysis, and chromosome count. Described as an endemic for Brunei, it appears to be present in Sarawak as well (*Ilias Paie S 42752*).

Specimens examined: BORNEO. **Brunei:** Tutong, Rambai, Ulu Tutong, Bukit Bahak, M.J.E. Coode et al. 7062 (K); Belait, Labi, Sungai Rampayoh, Jan 1994, D.W. Kirkup & M.J.E. Coode 808 (KEP, L. SING); Belait, Bukit Sawat, Jalan Merangking-Buau, Sg. Sindum, May 1997, Suhaili Hj. Zinin et al. BRUN 18020 (SING). **Sarawak:** Sri Aman, 99 mile Kuching Simanggang Road, Sep. 1980, I. Paie S 42752 (L).

21. *Amischotolype strigosa* Duist. sp. nov. (Fig. 7)

Amischotolype irritanti similis in bracteis sepalis, petalis cum pilis rubris spinosis, sed caule repentiore, internodiis vaginisque pubescentibus, foliis capsulisque minoribus, capsulis pubescentioribus differt. TYPUS: R. Soedarsono 349. February 1973. Indonesia, Sumatera, N, Bukit Lawang-Bohorok-Langkat (holo SING; iso L).

Stem ascending from short rhizome; erect part c. 100 cm long, simple; internodes moderately 1.5 mm long yellow-hairy. **Sheath** 7–10 mm diam., with many lines of 4 mm long, yellow hairs, mouth ciliate. **Leaf blade** 17–18 × 2.5–3.6 cm, 5–6.8 times as long as wide, base gradually narrowed into indistinct pseudopetiole; both surfaces moderately 1.5–3 mm long yellow-hairy; submarginal hairs on upper surface, 1.5 mm long, moderately dense, yellow. **Inflorescence** on erect stem, sessile, 1.8–2.2 cm diam., very dense with branches obscure, 20–30-flowered. **Pedicel** 2–5 mm long. **Sepals** 7–8 × 1.5–2 mm in flower, elongating to 9 mm long in fruit, colour unknown, rather densely 2 mm long spiny (dark) red-hairy, tip not hooded. **Petals** c. 8 × 1.5 mm, as long to slightly longer than sepals, white, dorsal surface apically with 2.5 mm long spot of 1–1.5 mm long red spiny hairs, margin entire. **Stamens** with filaments c. 10 mm long, colour unknown, glabrous; anthers c. 1.2 × 0.7 mm, colour unknown, thecae opening by a longitudinal slit. **Capsule** c. 5 × 3.5 mm, obovoid, shorter than sepals by c. 2 mm, colour unknown, upper 1/3 1 mm long, red spiny-hairy; valves free; apex slightly depressed, lobes absent; style remnant 1 × 0.1–0.2 mm, deciduous. **Seeds** 2 per locule, aril colour unknown.

Distribution. Sumatera (Sumatera Utara: between Medan and Gunung Leuser).

Ecology. Marshy places in recently logged-over forest. Altitude: 50–200 m asl.

Notes. The epithet refers to the red spiny hairs on the bracts, sepals and petals, characters it shares with *A. irritans*. However, the internodes and sheaths are hairy, the leaf blades and capsules are smaller, and the capsules are more hairy, characters sufficient to warrant recognition of a new species.

Specimens examined: SUMATERA. **Sumatera Utara:** Bukit Lawang-Bohorok-Langkat, Feb 1973, R. Soedarsono 349 (L. SING); Sikundur F.R., 75 km NW of Medan, Besitang River, Aug 1979, W.J.J.O. de Wilde & B.E.E. de Wilde-Duyfjes 19490 (KLU, L).

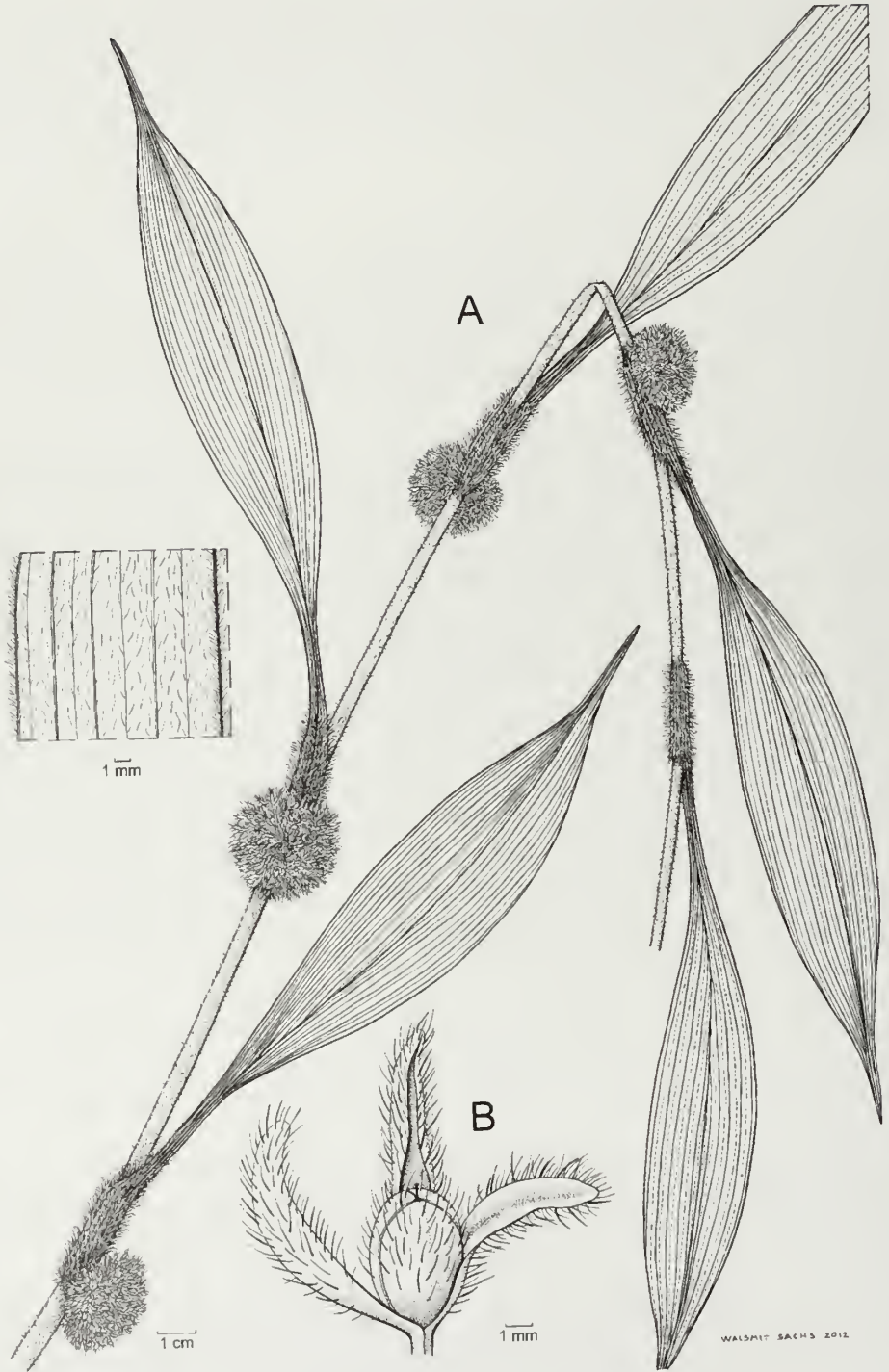


Fig. 7. *Amischotolype strigosa* Duist. **A.** Habit. **B.** Immature fruit with persistent sepals. Drawing by A. Walsmit Sachs, from R. Soedarsono 349 (L).

22. *Amischotolype welzeniana* Duist. **sp. nov.** (Fig. 8)

A congeneribus in vaginis laminis sepalis capsulis glabris differt. TYPUS: Maxwell 85-955, Peninsular Thailand, Trang, Khao Chong National Park, 300 m alt., somewhat disturbed thicket along trail in primary evergreen forest (holo L; iso SINU, E).

Stem ascending from creeping rhizome; erect part 50–100 cm long, simple; internodes glabrous. **Sheath** 7–11 mm diam., glabrous, mouth ciliate. **Leaf blade** 26–30 × 6–8.1 cm, 3.5–4.7 times as long as wide, lower surface green or tinged with purple, base very gradually narrowed into indistinct pseudopetiole; both surfaces glabrous; submarginal hairs on upper surface and margin, 1–1.5 mm long, dense, yellow. **Inflorescence** on erect stem, sessile, 1.5–3.4 cm diam., dense with branches obscure, 15–many-flowered. **Pedicel** absent. **Sepals** 7–13 × 2.5–3 mm, probably elongating in fruit, whitish (in flower) turning deep violet (in fruit), glabrous, tip hooded. **Petals** c. 8 × 2 mm, slightly longer than sepals, white, glabrous, margins unknown. **Stamens** with filaments cream-coloured, at apex with few 0.5 mm long hairs; anthers 2–2.2 × 0.4 mm, cream-coloured, thecae opening by a longitudinal slit. **Capsule** (immature) 9 × 4 mm, ovoid, shorter than sepals by c. 3.5 mm, mauve or green tinted with purple, glabrous; valves fused for 4/5 of length; apex depressed, lobes 0.5 mm long; style remnant 1 × 0.2 mm, probably persistent. **Seeds** 2 per locule, aril orange.

Distribution. Myanmar (Tenasserim: Tavoy), Thailand (C: Krung Thep Maha Nakhon (Bangkok); Peninsular Thailand: Trang, Surat Thani).

Ecology. Evergreen forest, on rocks, or in somewhat disturbed thickets along trails. Altitude: 210–300 m asl.

Notes. The species has been named after P.C. van Welzen on the occasion of his inauguration to professor (*Tropical Plantbiogeography*) on 19 Jan 2009. The plant is strikingly glabrous throughout (sheaths, leaf blades, sepals and capsules) which distinguishes it from all other species in the genus. The filaments are almost glabrous. I have not seen fully ripened fruits; the largest are those of the type specimen and they still seem to be immature. It is possible that ripe fruits are larger than described here.

Specimens examined: MYANMAR. **Tenasserim:** Tavoy, Aug 1961, *J. Keenan et al.* 785 (E). THAILAND. **C:** Krung Thep Maha Nakhon (Bangkok), Tung Song, Jul 1929, *Rahil* 96 (L); **Peninsular Thailand:** Surat Thani, Kao Nawng, Aug 1927, *A.F.G. Kerr* 13225 (L); Trang, Khao Chong National Park, Oct 1985, *J.F. Maxwell* 85-955 (E, L, SINU).

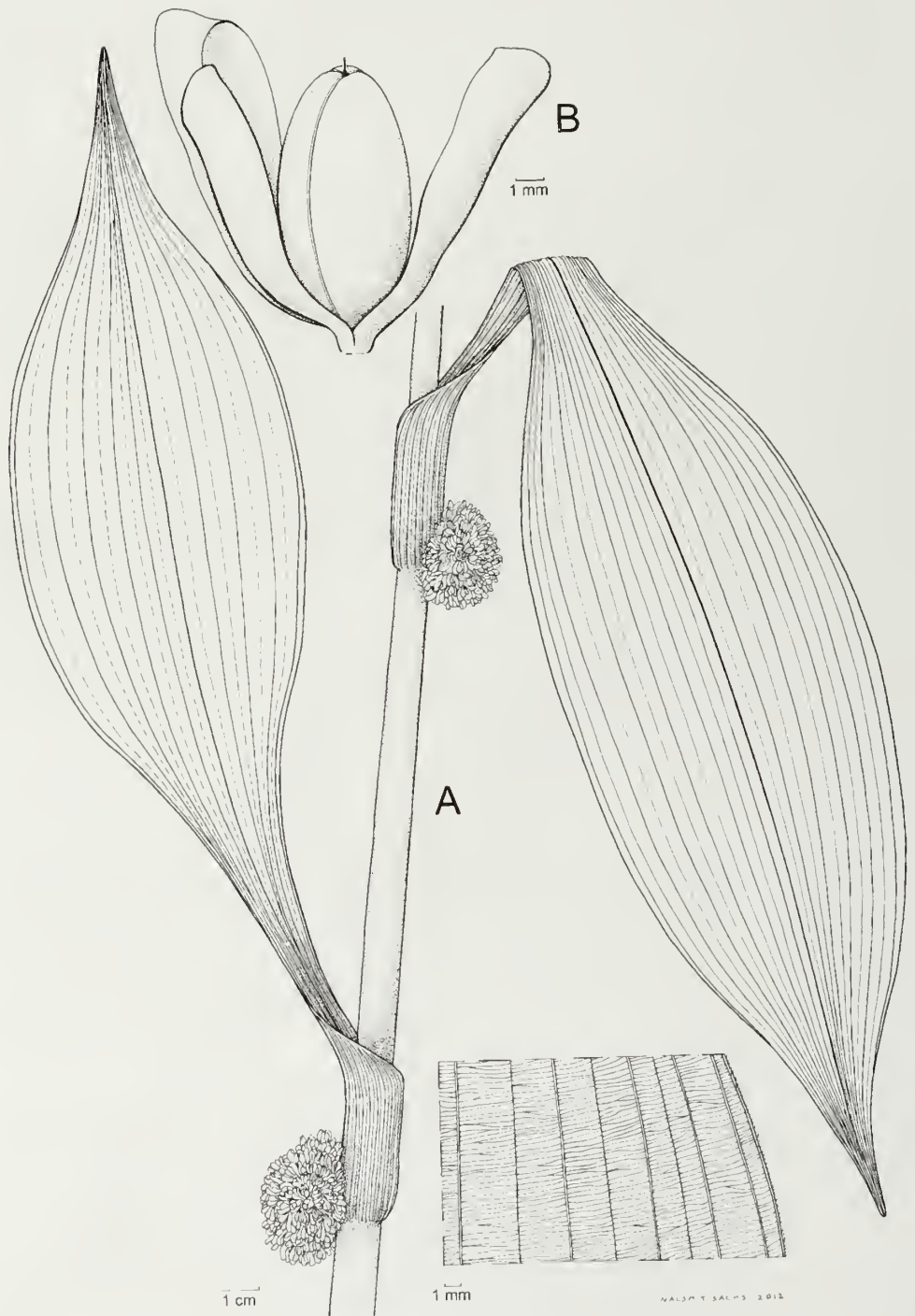


Fig. 8. *Amischotolype welzeniana* Duist. **A.** Habit. **B.** Immature fruit with persistent sepals. Drawing by A. Walsmit Sachs, from *J.F. Maxwell 85-955* (L).

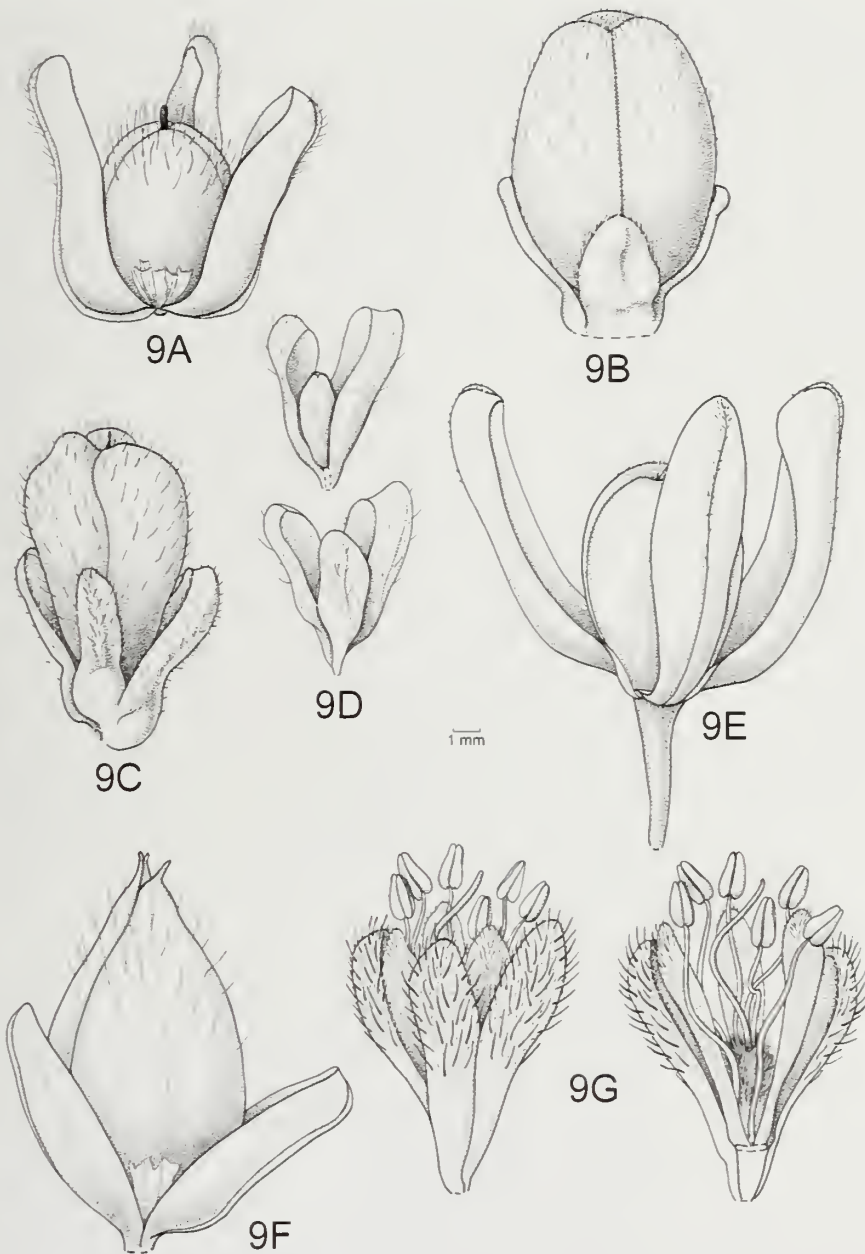


Fig. 9. Flower details. **A.** *Amischotolype glabrata* Hassk. Based on *F.W. Junghuhn s.n.* (L). **B.** *Amischotolype gracilis* (Ridl.) I.M.Turner. Based on *H. Duistermaat 348* (L). **C.** *Amischotolype griffithii* (C.B.Clarke) I.M.Turner. Based on *J.S. Burley et al. 1237* (L). **D.** *Amischotolype hirsuta* (Hallier f.) Duist. Based on *H. Winkler 2617* (L). **E.** *Amischotolype hispida* (A.Rich.) D.Y.Hong. Based on *Lesson ex J.K. Hasskarl s.n.* (L). **F.** *Amischotolype hookeri* (Hassk.) H.Hara. Based on *J.D. Hooker & T. Thompson s.n.* (L). **G.** *Amischotolype irritans* (Ridl.) I.M.Turner. Based on *H. Duistermaat 346* (L). All drawings by Walsmit Sachs.

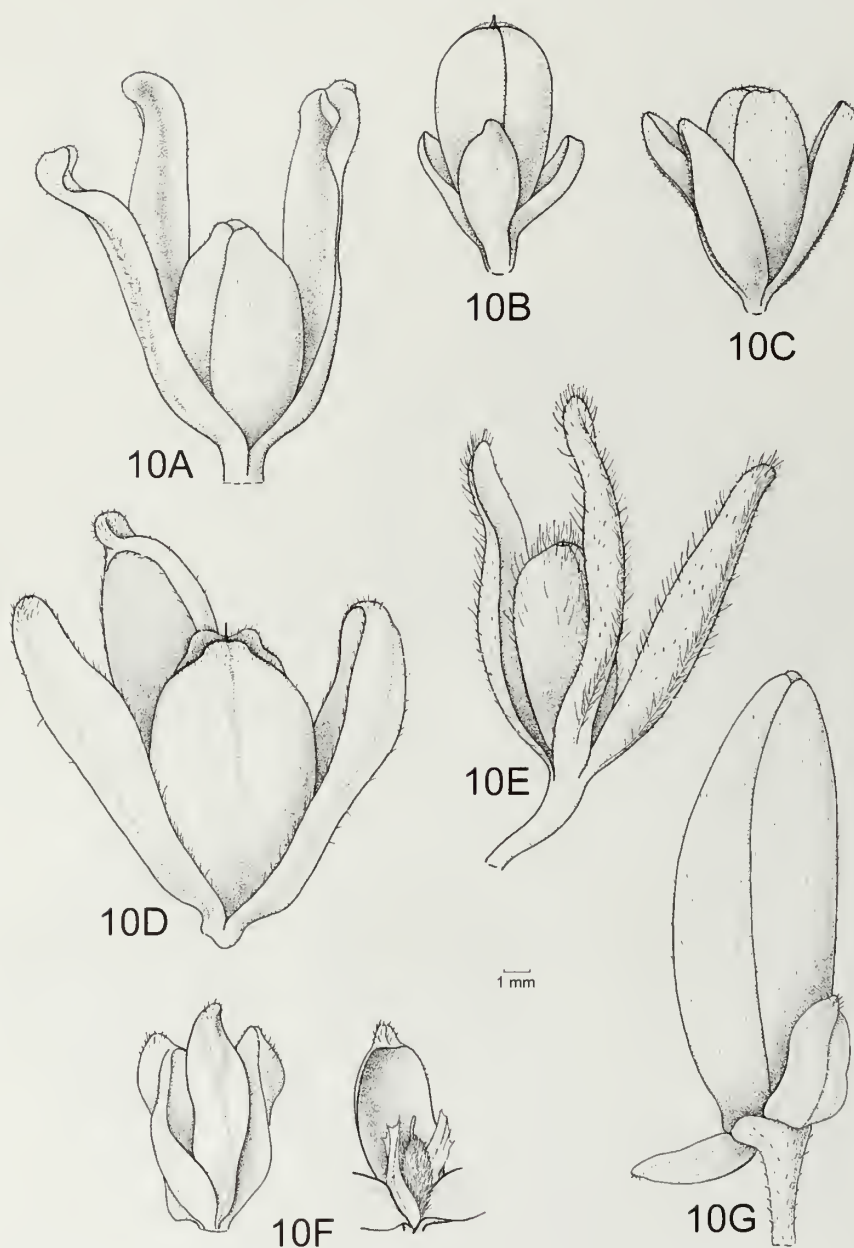


Fig. 10. Flower details. **A.** *Amischotolype laxiflora* (Merr.) Faden. Based on *Hallier f. B 3001* (L). **B.** *Amischotolype leiocarpa* (Hallier f.) Duist. Based on *H. Hallier B3002* (L). **C.** *Amischotolype marginata* (Blume) Hassk. Based on *C.L. Blume s.n.* (L). **D.** *Amischotolype mollissima* (Blume) Hassk. Based on *C.L. Blume s.n.* (L). **E.** *Amischotolype monosperma* (C.B.Clarke) I.M.Turner. Based on *Md.Nur SF 34206* (L). **F.** *Amischotolype rostrata* (Hassk.) Duist. Based on *F.W. Junghuhn s.n.* (L). **G.** *Amischotolype sphagnorrhiza* Cowley. Based on *D.W. Kirkup & M.J.E. Coode 808* (L). All drawings by Walsmit Sachs.

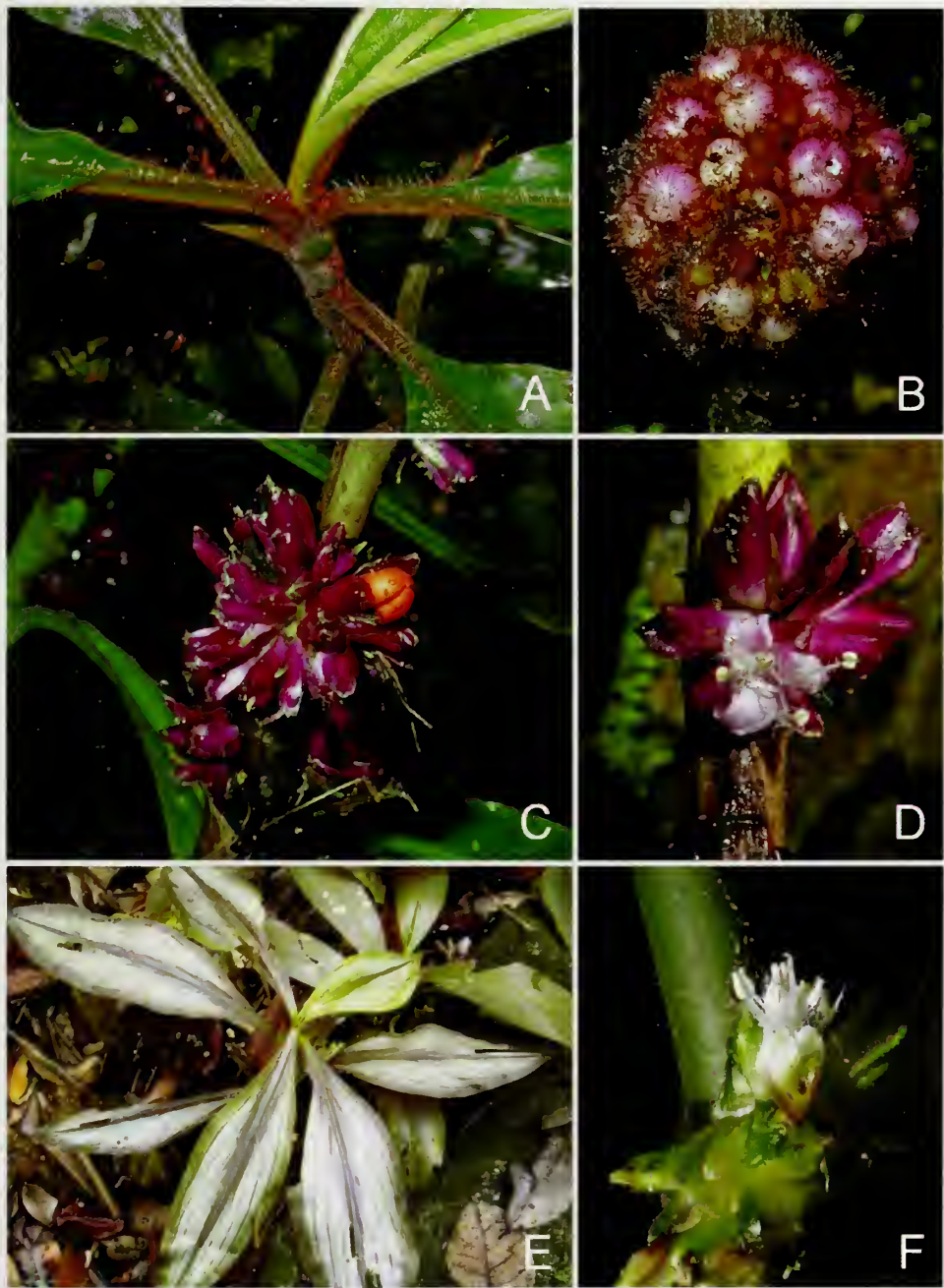


Fig. 11. A–B. *Amischotolype barbarossa* Duist. A. Stem with orange-hairy sheaths and leaf blades. B. Inflorescence with ripe, red-hairy fruits. From *FRI 57441*. C–D. *Amischotolype glabrata* Hassk. C. Inflorescence with opened fruit showing three seeds each with orange aril. D. Inflorescence with fully opened flower. From *Duistermaat 392*. E–F. *Amischotolype gracilis* (Ridl.) I.M.Turner. E. Plant with silvery-white variegated leaves. From *Duistermaat 353*. F. Inflorescence with opened flower. From *Duistermaat 336*. All photographs by J.J. Vermeulen, except E by H. Duistermaat.



Fig. 12. *Amischotolype gracilis* (Ridl.) I.M.Turner. **A.** Stem with glabrous sheaths and leaf blades with red submarginal hairs on the upper surface. Photograph by J.J. Vermeulen from *Duistermaat 328*. **B.** Erect stem with leaves and at each node an inflorescence perforating the sheath at its base. Photograph by: H. Duistermaat from *Duistermaat 328*. **C.** Inflorescence with ripe purple fruit. Photograph by: H. Duistermaat from *Duistermaat 348*. **D.** Inflorescence with ripe white fruits. Photograph by Chew, M.Y., FRIM from *FRI 55597*.



Fig. 13. **A.** *Amischotolype hirsuta* (Hallier f.) Duist. Erect stem with hairy leaves and fruiting inflorescence. Photograph by J.J. Vermeulen from *Duistermaat* 398. **B.** *Amischotolype hispida* (A. Rich.) D.Y.Hong. Erect leafy stem with inflorescences. Photograph by Serena Lee from *S. Lee* 426. **C.** *Amischotolype irritans* (Ridl.) I.M.Turner. Erect stem with glabrous sheaths and red-spiny-hairy inflorescence. Photograph by H. Duistermaat from *Duistermaat* 346. **D.** *Amischotolype parvifructa* Duist. Erect stem with leaves and inflorescence with white fruits. Photograph by H. Duistermaat from *FRI* 70474.

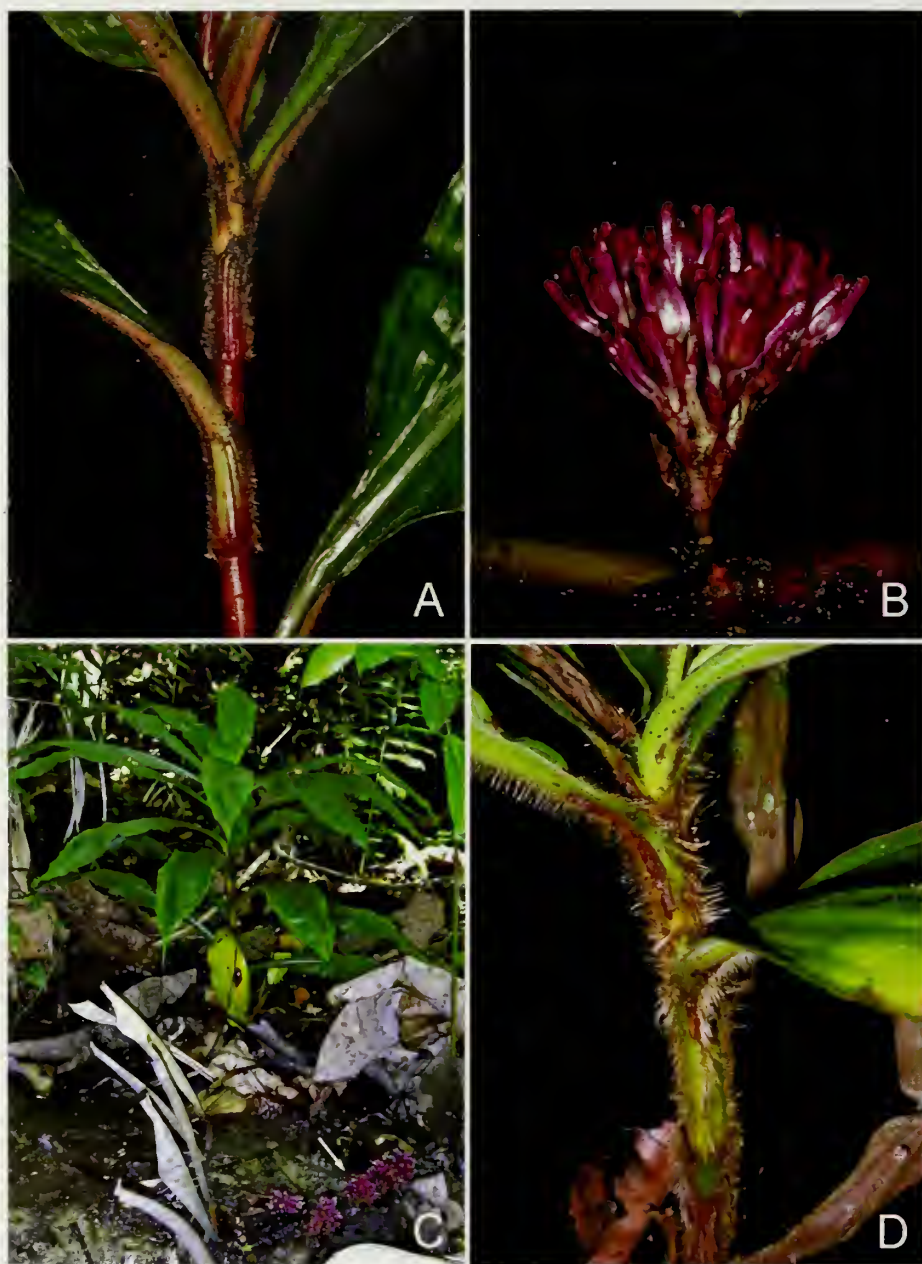


Fig. 14. A–B. *Amischotolype laxiflora* (Merr.) Faden. A. Stem with hairy sheaths. B. Inflorescence on leafless rhizome. Photographs by J.J. Vermeulen from *Duistermaat* 401. C–D. *Amischotolype marginata* (Blume) Hassk. C. Erect stem with leaves in the background, the leafless rhizome with purple inflorescences in the foreground, both indicated with a white arrow. Photograph by H. Duistermaat from *Duistermaat* 342. D. Stem with hairy sheaths. Photograph by J.J. Vermeulen from *Duistermaat* 400.

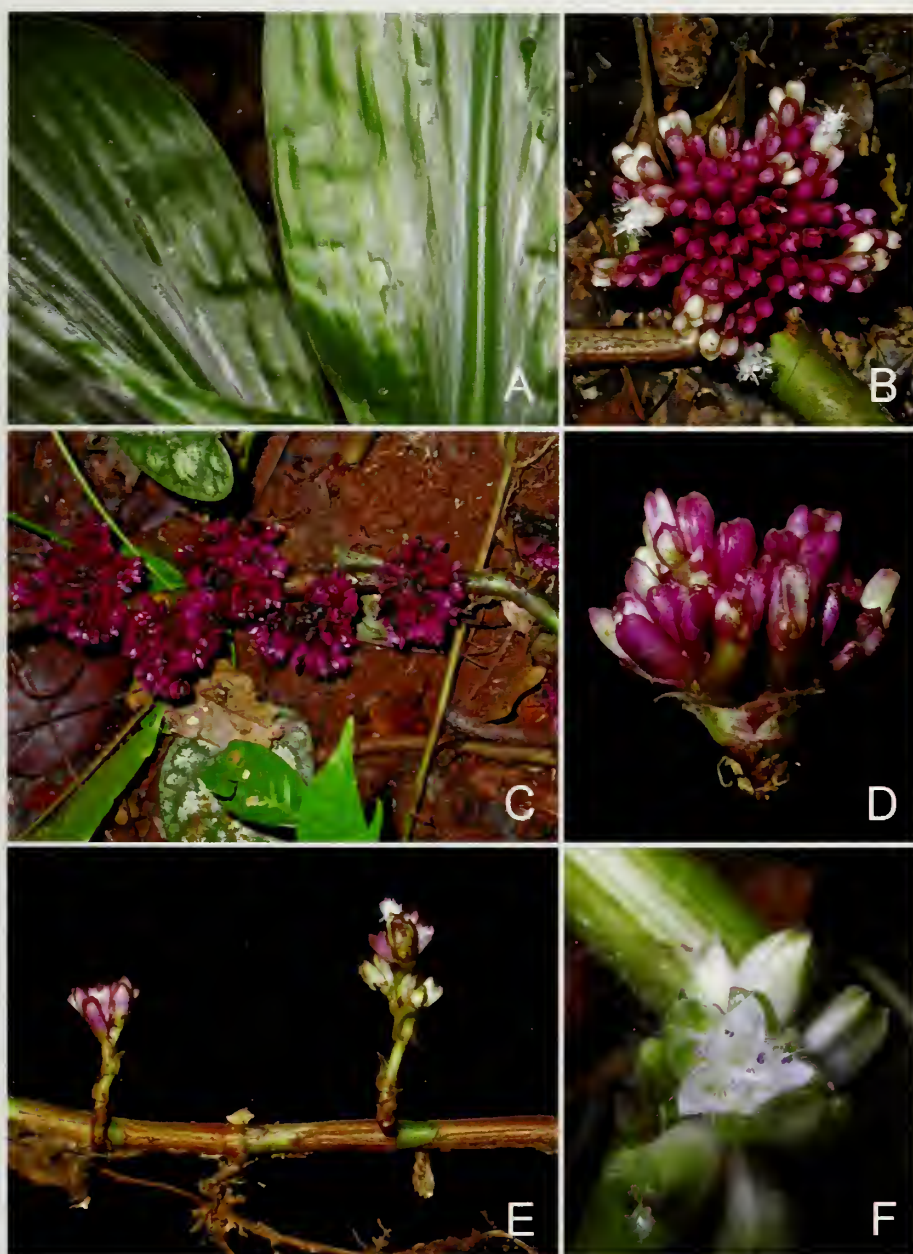


Fig. 15. *Amischotolype marginata* (Blume) Hassk. **A.** Plicate leaf blade with indistinct submarginal hairs. From *Duistermaat* 329. **B.** Inflorescence on rhizome with open flowers. From *Duistermaat* 395. **C.** Ripening purple inflorescences at the nodes of the leafless rhizome. From *FRI* 58591. **D.** Ripening inflorescence. From *Duistermaat* 395. **E.** Few-flowered inflorescences on long peduncles. From *Duistermaat* 400. **F.** Fully opened flower showing purple anthers. From *Duistermaat* 358. All photographs by J.J. Vermeulen, except A by H. Duistermaat.



Fig. 16. *Amischotolype marginata* (Blume) Hassk. **A.** Flowering white to pale purple inflorescences on rhizome. Photograph by Paul K.F. Leong from *Duistermaat* 329. **B.** Inflorescence with purple sepals, white fruits and one opened fruit showing three orange arils covering the seeds. Photograph by J.J. Vermeulen from *Duistermaat* 358.



Fig. 17. *Amischotolype monosperma* (C.B.Clarke) I.M.Turner. **A.** 'Rosette' of leaves at the apex of the stem. From *HBL (Vogel)* 960236. **B.** Inflorescence with ripening fruits. From *Duistermaat* 397. **C.** Young inflorescence with first flower opened. From *Duistermaat* 397. All photographs by J.J. Vermeulen.



Fig. 18. *Amischotolype monosperma* (C.B.Clarke) I.M.Turner. Detail of inflorescence showing opened flower with cream-coloured red-hairy sepals. Photograph by André Schuiteman from HBL (Vögel) 960236.

Nomina dubiae

A. mollissima (Blume) Hassk. var. *marginata* (Blume) R.S.Rao, Maharashtra Vidnyan Mandir, Patrika 6, 2 (1971) 53, *nom. inval.*

A. mollissima (Blume) var. *glabrata* (Hassk.) R.S.Rao, *ibid.*

Notes. Rao (1971) made two new combinations for the flora of India: *A. mollissima* (Blume) Hassk. var. *marginata* (Blume) R.S.Rao, and *A. mollissima* (Blume) var. *glabrata* (Hassk.) R.S.Rao. He cited *Campelia mollissima* Blume for both, and *Forrestia mollis* Hassk. only for var. *marginata*. It may therefore be concluded that he considered this var. *marginata* the typical variety. Because an autonym is required, the combination *A. mollissima* var. *marginata* (Blume) R.S.Rao is invalid. Furthermore, both combinations should be considered as *nomina confusa*. For *A. mollissima* var. *marginata*, *C. marginata*, *C. mollissima* and *F. hispida* are cited, but these are not known to occur in India. For *A. mollissima* var. *glabrata*, both *C. glabrata* and *Forrestia hookeri* Hassk. are cited, which are here considered as distinct species both occurring in India. Rao (1971) neither gives descriptions, nor does he cite material for his varieties. However, the combination *Amischotolype mollissima* (Blume) Hassk. var. *glabrata* (Hassk.) R.S.Rao has been made validly.

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Appendix A. Character synopsis for the species of *Amischotolype* and *Porandra*: vegetative characters.

	1. <i>A. barbarossa</i>	2. <i>A. divaricata</i>	3. <i>A. dolichandra</i>	4. <i>A. glabrata</i>	5. <i>A. gracilis</i>	6. <i>A. griffithii</i>	7. <i>A. hirsuta</i>	8. <i>A. hispida</i>	9. <i>A. hookeri</i>	10. <i>A. irrianus</i>	11. <i>A. laxiflora</i>	12. <i>A. leiocarpa</i>	13. <i>A. lobata</i>	14. <i>A. marginata</i>	15. <i>A. mollissima</i>	16. <i>A. monosperma</i>	17. <i>A. parvifructa</i>	18. <i>A. pedicellata</i>	19. <i>A. rostrata</i>	20. <i>A. sphagnorrhiza</i>	21. <i>A. strigosa</i>	22. <i>A. welzeniana</i>	P1. <i>Porandra ramosa</i>	P2. <i>Porandra scandens</i>
RHIZOME																								
absent	+	+	?	+	+	+	+	+	?	+	+	?	+	+	+	+	?	+	+	+	+	+	?	?
STEM																								
simple	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
branched																								
scrambling		+	+	+			(+)	+											+				+	+
INTERNODE HAIRS																								
absent		+	+	+	+	+	(+)	+	+	(+)	+	+	+	+	+	+	+	+	+	?		+	+	?
0.1–0.5 mm long	(+)			+			(+)	+	+	+	+	+	+	+	(+)	+	+	+	(+)	?			+	+
0.6–0.9 mm long	(+)						(+)	+	+				+	+						?			+	+
≥ 1 mm long	+						+													?	+			?
SHEATH HAIRINESS																								
glabrous				+	+	+	(+)	(+)	+	+	+	+		(+)	+	+	+		(+)	+		+	+	+
scattered and < 1 mm long	+		+	+	+		(+)	(+)	+	(+)	+	+	+	(+)	+	(+)	+	+	+			+	+	+
in lines and 0.5–1 mm long					(+)														+			+	+	+
in lines and ≥ 1 mm long	+	+		+	(+)		+	+	+		+		+	+	+	+		+			+		+	+
in ring at node, 0.5–1 mm long		+			(+)																			
LEAF BLADE SURFACE																								
smooth	?	?	?	+	+	?	?	?	+	+		?	?		?		+	?	?	+	?	?	?	?
bullate	?	?	?			?	?	?			+	?	?	+	?	+		?	?		?	?	?	?
LOWER LEAF SURFACE																								
HAIRINESS*																								
glabrous		+	+	+	+			+			+	+	(+)	+	(+)	+	+	+	+	+		+	+	+
hairs < 0.5 mm long		+		(+)	+			+	+		(+)	(+)	+	+	(+)	+	+	+	+	+		+	+	+
hairs 0.5–1 mm long	+		+	(+)	+	+	(+)	(+)	+	+		(+)	(+)	(+)	+	(+)	+	+	+	+		+	+	+
hairs > 1 mm long	(+)		(+)		+	+	+			+											+			
UPPER LEAF SURFACE																								
HAIRINESS*																								
glabrous	+	+	+	+	+			+	+		+	+	+	+	+	+	+	+	+	+		+	+	+
hairs < 0.5 mm long	(+)	(+)			(+)		(+)	(+)			(+)		+	(+)	(+)	(+)	+	+	+	+		+	+	+
hairs 0.5–1 mm long				(+)		+	(+)	(+)		+				(+)	(+)	(+)	+	+	+	+		+	+	+
hairs > 1 mm long						+	+	(+)	+	+											+			
LEAF SUBMARGINAL																								
HAIRS - PRESENCE																								
absent											(+)	+							(+)	+	+	+	+	+
on upper surface	(+)	+	+	(+)	+	+	+	+		+	+	(+)	+	+	+	+	+	+		+	+	+	+	+
along margin	(+)	(+)		(+)					+													+	+	+
on lower surface	+			+					+			+						+					+	+
LEAF SUBMARGINAL																								
HAIRS - LENGTH																								
≤ 0.5 mm long		+		+			(+)	(+)	(+)		+	+		+	(+)	+	+		+			+	+	+
>0.5 <1 mm long		+	+	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)			(+)	(+)	+			(+)			+	+	+
1–2 mm long	+		+		+	+	+	+	+	+		+	+	(+)	+	+	+		(+)		+	+		+
> 2 mm long					+	+			+	+				(+)	+			+	(+)					+
LEAF SUBMARGINAL																								
HAIRS - COLOUR																								
colourless				+							+	+		+		+			+				+	+
white					(+)	+	+	+	+	+			+	+	+	+	+					+		+
yellow to yellow-brown	+	+	+	+		+	+	+	+	+	+		+	+	+	+		+				+		+
orange to red						(+)																		

*except near and on midvein.

Appendix B. Character synopsis for the species of *Amischotolype* and *Porandra*: inflorescence, flower and fruit characters.

	1. <i>A. barbarossa</i>	2. <i>A. divaricata</i>	3. <i>A. dolichandra</i>	4. <i>A. glabrata</i>	5. <i>A. gracilis</i>	6. <i>A. griffithii</i>	7. <i>A. hirsuta</i>	8. <i>A. hispida</i>	9. <i>A. hookeri</i>	10. <i>A. irritans</i>	11. <i>A. laxiflora</i>	12. <i>A. leiocarpa</i>	13. <i>A. lobata</i>	14. <i>A. marginata</i>	15. <i>A. mollissima</i>	16. <i>A. monosperma</i>	17. <i>A. parvifructa</i>	18. <i>A. pedicellata</i>	19. <i>A. rostrata</i>	20. <i>A. sphagnumrhiza</i>	21. <i>A. strigosa</i>	22. <i>A. welzeniana</i>	P1. <i>Porandra ramosa</i>	P2. <i>Porandra scandens</i>
INFLORESCENCE POSITION																								
rhizome	+						(+)				+					+								
knee		+																						
erect stem	+		+		+	+		+	+	+			+				+			+				
PEDUNCLE												(-),												
absent/present	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	(-),	-	-	-	+	-	-	-	-
PEDICEL																								
absent		+	+	+	+	+			+					+	+	+	+	+	+			+	+	+
≤ 1.5 mm long	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+
> 1.5 mm long								+			+				+			+		+				
SEPAL HAIRS - PRESENCE, COLOUR																								
absent		+	+	(+)	(+)		+	+	+		+	+	+	+	(+)		+	+	+			+	+	+
colourless-white-yellow																								
orange-red-brown	+									+						+				+	+			
SEPAL HAIRS - HAIR TYPE																								
soft	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+			+	+	+
bristly/spiny										+														
PETAL HAIRINESS																								
glabrous (-) / hairy (+)	-	-	-	-	(+)	-	-	-	-	+	-	?	-	-	-	-	?	-	-	-	+	-	?	?
STAMEN FILAMENT																								
HAIRINESS																								
glabrous		+	+							+		?					?				+		+	+
0.5–1 mm long		+					(+)	+			?	?	+				?	+		+		+	+	+
> 1 mm long	+			+	+	+	+	+	+	+	+	?	?		+	+	?	+	+			+	+	+
THECAE OPENING																								
apical pore					+	+		+	+	+	+	+	+	+	+	+	?	?		+			+	+
half slit																	?	?						
longitudinal slit	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	?	?	+	+	+	+	+	+
ANTHER LENGTH																								
< 1 mm long				+								?					?	+	+				+	+
1–1.9 mm long	+		(+)	+	+	+	+	+	+	+	+	?	+	+	+	+	?		+	+	+	+	+	+
2–3 mm long		+	+					+	+		+	?					?						+	+
CAPSULE : SEPAL LENGTH																								
capsule longer	+	+			+	+	+		+			+		+	+	+	+	+	+	+		+	+	+
equal	+						(+)						(+)	+	+	+		+				+	+	+
capsule shorter	+		+	+				+		+	+		(+)	+	+	+		+		+	+	+	+	+
CAPSULE HAIRINESS																								
absent				(+)								+												
soft	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+
bristly/spiny		+					+			+			+					+		+		+	+	+
CAPSULE HAIR LENGTH																								
< 1 mm long					+	(+)	+	+	+	+	+			+	+	+	+	+	+	+		+	+	+
≥ 1 mm long	+	+	+	+	+	+	+	(+)	(+)	+			+	(+)	+	+	+	+	+	+	+	+	(+)	+
CAPSULE HAIR COLOUR																								
colourless-white-yellow		+	+	+	+	+	+	+	+		+		+	+	+	+	+	+	+	+		+	+	+
orange-red-brown	+												+	+	+	+		(+)		+	+	+	+	+
CAPSULE SHAPE																								
ovoid	+	+					+	+	+				+	+	+	+	+	+	+	+	+	+	+	+
obovoid			+	+	+						+		+	+	+	+	+	+	+	+	+	+	+	+
pyriform						+	+					+									+	+	+	+
CAPSULE APEX																								
depressed	+	(+)			+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
obtuse		+	+	+					+										+			+	+	+
acute																								
LOBES AT CAPSULE APEX																								
absent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
0.3–0.5 mm long	+																					+	+	+
> 0.5 mm long													+		+	+							+	+
CAPSULE VALVES																								
free (fused < 1/4 length)	+		+		+	+	+		+	+	+	+	+	+	+	?	?	?	?	+	+		+	+
fused > 1/4–half length				+				+	+						+	?	?	?				+	+	+
fused 4/5 length		+														?	?	?	+				+	+
STYLE REMNANT																								
persistent		+	+	+			(+)	+	+			+			+	+	+	+	+		(?)	+	+	+
(finally) deciduous or absent	+											+				+						+	+	+

